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REPORT

Samgods 0.8 User Manual

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Kontaktperson: Petter Hill
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Preface

The national model for freight transportation in Sweden is called Samgods and is aimed to provide a tool for forecasting and planning of the transport system in Sweden. Samgods can be used for forecasting of possible future scenarios, such as the evaluation of the effects of transport policies. Samgods consists of several parts, where the logistics module is the core of the model system. In the logistic module, different types of commodities are assigned to different types of transport chains based on minimization of the total logistics cost.

The Samgods model exists in two official versions, Samgods 0.8 and Samgods 0.9. The recommendation from the Swedish Transport Administration is that Samgods 0.9 is to be used only to analysis that either are related to the work on the Swedish transport plan and/or analysis where capacity restrictions on railway is crucial for the simulation. Samgods 0.9 is simplified compared to Samgods 0.8 and lacks a graphical user interface. Future development of the Samgods model will be based on Samgods 0.8.

This document is the manual on how to use the Samgods 0.8 model system. For more information about the different parts of the Samgods model, please refer to:

- Method report of the logistic model
- Program documentation of the logistic model.
- Representation of the Swedish transport and logistics system
- Swedish base matrices report

All reports could be downloaded here: http://www.trafikverket.se/Samgods/

Trafikverket has commissioned Citilabs to incorporate Samgods in Cube and produced the first version of the manual. Trafikverket and Sweco have carried out a substantial part of testing and troubleshooting the system.

List of contributors

Jon Bergström	Barret	Code tester of the logistic module
Gabriella Sala	Citilabs	Developer of the graphical user interface and the model setup, co-author of the manual
Paolo Marotti	Citilabs	Co-developer of the graphical user interface and the model setup
Gerard de Jong	Significance	Developer and specialist of the logistic module
Jaap Baak	Significance	Developer and programmer of the logistic module
Henrik Edwards	Sweco	Developer, tester and specialist of the logistic module
Linda Ramstedt	Sweco	Model tester
Anders Bornström	The Swedish Transport Administration	Transport analyst, Emme expert and tester of the model
Petter Hill	The Swedish Transport Administration	Project manager
Petter Wikström	The Swedish Transport Administration	Transport analyst, railway expert and tester of the model
Moa Berglund	WSP	Co-author of the manual and model tester

Introduction

This document is the manual for how to use of the graphical user interface of the Samgods model in Cube. It describes how to setup input files to run the Logistics Module of the Samgods model, how to visualize the output (modal split, traffic work, etc.), and how to compare the output from different scenarios. Moreover, the manual aims to show how to use different tools developed to facilitate the handling of the large amounts of data produced by the model.

The system consists of a set of main software components:

- The Logistic module, which is the core of the system.
- Cube Base, where the graphical user interface of Samgods is incorporated.
- Cube Voyager, which is a transport modelling software used to implement supply and assignment models.
- Cube GIS, which is the geographical information system where the network of the model is implemented.
- Emme, which is another transport modelling software used to implement supply and assignment models, which can be used instead of Cube Voyager.[1]

For a test between the performances of the applications with Emme vs. Voyager respectively, please refer to the Appendix 9.2.

Below is the outline of the manual:

Chapter 0: Practical instructions for how to install the Samgods GUI in Cube, together with system requirements.

Chapter 2: General description of the structure of the GUI, the different windows and how to work with the applications. It also contains a table showing all the all data that can be accessed via the Data Section window in the GUI.

Chapter 3: Detailed description of all applications, in terms of input data, possible actions and choices for how to use the different applications in the system and how to set up the results. This chapter should be used more as a look-up guide per application, than be read from start to end.

Chapter 4: General instructions for how to use the graphical user interface, listed after the kind of action the user wants to do. A user new to the system is advised to start reading here, after having read Chapter 2.

Chapter 5: Instructions for how to make different kinds of scenario setups.

Chapter 6: Log reports from the Samgods GUI.

Chapter 7: Check-list when errors occur.

Chapter 8: References.

Chapter 9: Appendices.

For the reader who is interested in getting started quickly and who already has some knowledge of the Cube system, it is recommended to make sure that the system is properly installed

[1] The reason to enable the usage of two network models is that both Emme and Voyager are relevant and possible to use with Samgods. The Swedish and the Norwegian national freight models have been developed in cooperation, but different network models are used. In Sweden Emme 3 is currently used, while Cube Voyager is used in Norway. In Sweden, Emme is also used for the national passenger model Sampers. A user which only is interested in freight transport modelling and wants to use a stable version is recommended to use Cube Voyager. A user who is interested in transport modelling of both freight and passenger in Sweden (i.e., Samgods and Sampers) is recommended to use Emme. Overall, it is recommended that the user selects the network model that is available to use.

(Chapter 1) and then jump to Chapter 4 and 5 for the specific analysis that he/she wants to carry out.

For the reader who has no previous knowledge of the Samgods GUI neither CUbe, it is recommended to start with Chapter 2 and then read Chapter 4 and 5 from the beginning and refer to Chapter 3 for more information on the specific applications. The appendix (Chapter 9) also contains explanations on some parts of the model.

The use of Cube Base and Cube Voyager is described in the reference guides RG_CubeBase.pdf and RG_CubeVoyager.pdf, which can be found where Cube is installed (under Citilabs\Cube folder).

Glossary

Below some important glossaries used in this manual are collected. Observe that for some glossaries the explanation is specific for this context.

Application – a group of programs

Assignment model – a model where the transport demand is assigned to the network. In this context, Emme or Voyager is used as assignment models.

Base scenario (or base) – the scenario that is used as reference scenario. See Scenario.

Catalog – the folder where the Samgods model and its set of scenarios are stored. Several catalogs, with their corresponding base scenarios, can be included in a project.

Demand model – a model of the transport demand in terms of OD matrices. In this context, the Logistics Module in the Samgods model is a demand model. The Logistics Module has the purpose to produce the OD matrices (demand for vehicle movements on legs) from the fixed transport demand provided in the PWC matrices.

Feature class - used in ArcGIS. This is a collection of geographic features with the same geometric type (such as point, line or polygon), the same attributes and the same spatial reference. Feature classes can be stored in geodatabases, shapefiles, coverages or other data formats. Feature classes allow homogeneous features to be grouped into a single unit for data storage purposes.

Geodatabase (or short: gdb) – a database designed to store and handle geographic information and spatial data.

Keys – a varying input into an application (i.e., parameter settings). Catalog keys are used to specify settings for the applications etc.

Layer – used in GIS. This is the visual representation of a geographic dataset in any digital map environment.

LOS (Level Of Service) matrix (or **skim matrix**) – a matrix where a particular measure, such as time, distances, costs, are summarized link-by-link along the minimum cost path for each OD pair. The distance, domestic distance, fee/toll, and extra cost LOS matrices (defined per vehicle type) are mandatory input to the Samgods model.

Program – a single task or an instance.

Scenario – refers to a set of input files or values. A scenario can be a base scenario, or it can be an alternative scenario that is studied in relation to the base scenario, e.g., a child to the base scenario. An *existing scenario* means that the scenario-specific tables are included in the main geodatabase.

Scenario folder – the folder containing all the data for a specific scenario, located in the Scenario_Tree folder.

Skim matrix – see LOS matrix

Standard outputs/reports – the outputs/reports that the Samgods GUI always produces.

Supply model – In this context, a supply model (or network model) is the model of the network where the transport infrastructure, such as nodes and links (i.e., ports, railways, roads, etc.), are implemented. In this context, Emme or Voyager is used as supply models.

TOC – Table Of Content, see Section 4.15

1. Installation Instructions

This chapter describes the installation requirements, required programs for the Samgods GUI and their download locations and the installation procedures for each required program. It also describes how to setup the Samgods model in Cube.

1.1. Minimum system requirements

Cube Base will run on any Intel Pentium 4-compatible personal computer (including Pentium 4, Centrino, Xeon, AMD, and Cyrix chips) running the Windows XP/7/8 or Windows Server 2003/2008 operating system. The requirements for processor speed, amount of RAM and hard disk space are directly related to the operating system, the network, and other file sizes. At a minimum, Citilabs recommends:

- Intel Pentium 4, AMD Athlon
- 1 GB of RAM
- 10 GB of hard disk space for the application and supporting applications and data (like GIS) ATAPI IDE, 5,400 rpm
- 100+ GB for output files
- 24 bit capable graphics accelerator OpenGL version 2.0 runtime and Shader Model 3.0 or higher is recommended ATI or Nvidia GPU is strongly recommended for any 3D GIS work or Cube Dynasim micro simulation
- 17-inch monitor, 1024 x 768 higher at Normal size (96dpi) 24 bit color depth
- Mouse or other pointing device
- Colour printer or plotter

A system with additional resources may be more appropriate for certain applications of this software.

Running the Samgods model at an acceptable performance puts a demand on the hardware as well as on the operating system. The hardware should preferably have several processors available for parallel executions and several GB of RAM to support the allocation of memory to each execution. The operating system needs to be able to allocate a certain amount of memory to the different processors, see the list below.

In tests, the Samgods group has lowered the total execution time from over 24 hours to 1.5 hour by using a server with 16 processors on a 64-bit Windows Server 2008 R2 Operating System, instead of a laptop with a single processor in an XP 32-bit environment.

The graphical interface of the Samgods model allows the user to set the number of commodity groups to run simultaneously, in order to have an optimal performance of the system (note that this option is available only if Java runtime environment is installed see Section 1.6 below). The monitoring of the parallel executions is done by a Java program underneath the GUI, but the actual work of allocating memory and tasks to each processor is done by the operating system itself.

There is an upper limit on how many processors that may be used:

- It is strongly recommended never to use more parallel executions than the number of available processors
- Each processor should in average have at least 1.8 GB of RAM available, or the program may encounter out-of-memory problems

- Since a 32-bit OS may allocate only 3.5 GB to a program as a maximum, it is strongly recommended to run the model on a 64-bit system
- The model has 34 commodity groups and may therefore never split the execution into more than 34 parallel executions, given an environment with 34 or more processors

1.2. Cube Software

For the Samgods GUI to function, certain Cube software is required. They are:

- Cube Base: 6.1.0 service pack 1
- Cube Voyager: 6.1.0 service pack 1
- Cube GIS: ArcGIS 10.1 service pack 1

This software is available at ftp://citilabsftp.com/release/cube610SP1setup.exe.

For the above Cube software, Citilabs License 2013 is required (but newer software and license versions may be available later on). Please contact Citilabs for further information regarding this.

1.3. Cube Installation

To install and run the model full administration rights are required on the PC, or more specifically on the model folder, the Citilabs program folder and the user folder. Do the following steps to install Cube (observe that these steps can be slightly different depending on previous installations, newer software versions, etc.):

1) Attach the dongle to the back of the machine
2) Install Citilabs License 2013 (or later available license versions)
3) Install Cube Base (double-click on the cube610SP1setup.exe file)
4) When requested, install ArcGIS Runtime 10.1 and ArcGIS Runtime 10.1 Service pack 1
5) Restart the computer

1.4. Emme Software

To make use of Emme in the Samgods GUI, the following software is recommended:

- Emme Software Release 3 3.4

1.5. Emme installation

Install and setup Emme in a standard manner. Install Emme3 software under C:\{Program folder}[2]\INRO\Emme\Emme3.3\Emme-3.3.4, and install the Inro keyserver program, which comes with the Emme3 package.

To change the environment variables, administration rights are required on the PC.

The following variables should be set.

- EMMEPATH=C:\Program Files\INRO\Emme\Emme 3.3\Emme-3.3.4
- Path = ... ;%EMMEPATH%\programs

Note that an interrupted emme3-run will create a emlocki-file4 (empty, with no extension). It is created in the directory of the emme3-databank which is {disk}\Samgods\01_Programs\EMME\. If the program shows an error, please delete this emlocki-file and try again.

[2] {Program folder} refers to the “Program Files” or “Program” folder on the computer – check what it is called on your computer

1.6. Other programs

If the user wishes to use the advanced options for the logistics module (please refer to Section 3.6 or 1 for details), it is also required to have:

- Java runtime environment (jre). Platform: 1.6. Product: 1.6.0_17 (later program versions are also possible to use)

Location for the above programs: http://www.java.com/sv/download/

1.7. Samgods GUI installation

Unzip the zipped file Samgods.rar, and select a destination folder. The default folder is C:\, however, any other folder is working as well. It is recommended to select a folder name without any blank value. Moreover, an advice is to put the folder rather close to the root (e.g., E:\Samgods\Workfolder\Destination-of-folder) since the path to Emme may contain maximum 64 digits.

The folder structure for the GUI is displayed in Table 1.

C:\Samgods\	Samgods.cat	Catalog file
	01_Programs	Folder
	02_Applications	Folder
	03_GIS_Data	Folder
	04_Media	Folder
	05_Input_Data	Folder
	06_Reports	Folder
	07_Python	Folder
	Scenario_Tree	Folder
	User_programs	Folder

Table 1 Folder structure.

The scenario folder for a specific scenario is located in the Scenario_Tree folder.

For the complete list of folders and files, see the technical documentation of the Samgods GUI.

To properly install all the programs connected to the model (GIS tools, user programs), do the following:

1) Open the catalog file (Samgods.cat) in Cube Base (double click on the catalog file or double click on the Cube icon on the desktop -> welcome screen -> open an existing catalog -> browse to Samgods.cat)
2) To update the paths for the application, double click on each application (in total 10 applications) under “Applications” window, and click “Yes” to the following question (10 times):

   “The base path of this Application has been moved from {Old folder} to {Selected folder}. Do you wish to update the path for all Application (.APP, .PRJ) and Control (.CTL) files in the Application structure? (Note the same subdirectory structure as in the original Applications will be assumed)”
3) To set the properties of the catalog file, start by right-clicking on the Samgods.cat file in the Cube interface (see the catalog name under the main toolbar) and select

"Properties". On the Catalog Properties window, select the "Model User" tab, and set the Model User as "Model Developer". Then, select the "Data Panel" tab, and set the values as in Figure 1

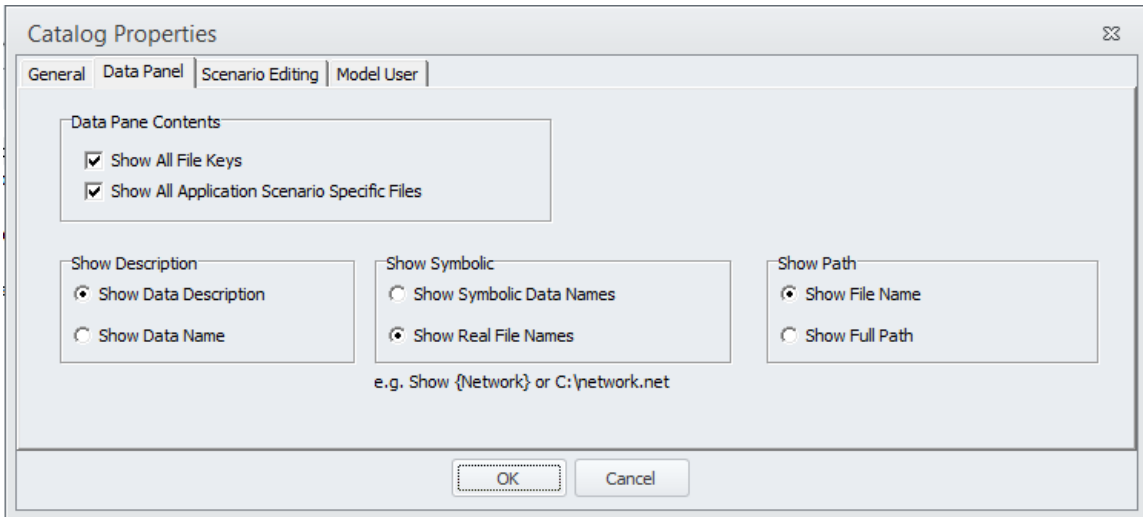


Figure 1 Setting of properties of the catalog file.

4) Click "OK" to continue
5) Modify the catalog keys (i.e., parameter settings) below from the interface in the following manner:
   a) Select Scenario_Tree scenario
   b) Select the *Installation* application
   c) Double-click on the Scenario_Tree scenario
   d) For the following catalog keys, change to its corresponding installed version if needed[3] (see Figure 2 for an example):
      i) "Cube Software" (pre-defined: version 6.1.0 Sp1)*
      ii) "EMME Software" (pre-defined: version 3.3.4)
      iii) "ArcGIS Software" (pre-defined: 10.1 Sp1)*
      iv) "Python Software" (pre-defined: version 27)
      v) "Logistics Model Software" (pre-defined: 20140317)
      vi) For the catalog key "Location of Cube Program" change if needed the folder where Cube is installed (pre-defined: C:\Program Files (x86)\)*
      vii) For the catalog key "Location of EMME Program" change if needed the folder where Emme is installed (pre-defined: C:\Program Files (x86)\)
      viii) For the catalog key "Location of ArcGIS Program" change if needed the folder where ArcGIS is installed (pre-defined: C:\\Program Files (x86)\\)*. Because this path is used by Python, it is important to use "/" or "\\" instead of "\" in this key, see Figure 2 below for an example
      ix) For the catalog key "Location of Python program" change if needed the folder where Python 26 is installed (pre-defined: C:\Python27\ArcGIS10.1)

[3] If you are using Swedish Windows 7/8, the system name of the standard *Program* folder is *Program Files*. So in the keys in the *Installation* application, use "C:\Program Files\...", not "C:\Program\...".

x) For the catalog key “Scenario name for the BASE scenario” point to the scenario that should be used as base scenario (pre-defined: Base2006)

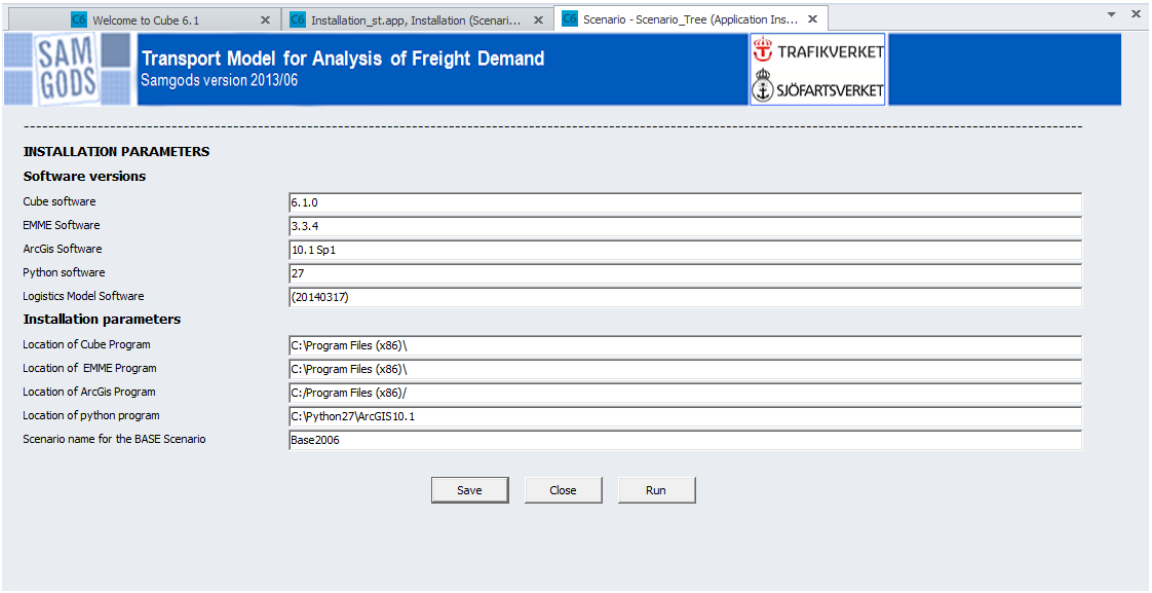


Figure 2 Example of catalog key values for the Installation application.

e) Run the Installation application by clicking “Run” in the scenario interface, or by selecting Application -> Run Application -> OK on the main toolbar (If “OK” is clicked instead of “Run”, the application will not run – the changes in the settings will only be saved.)

Now the GUI is installed.

* To properly set the values for the catalog keys indicated with *, see the information under the Menu Bar Help -> About (see Figure 3 and Figure 4 below for an example).

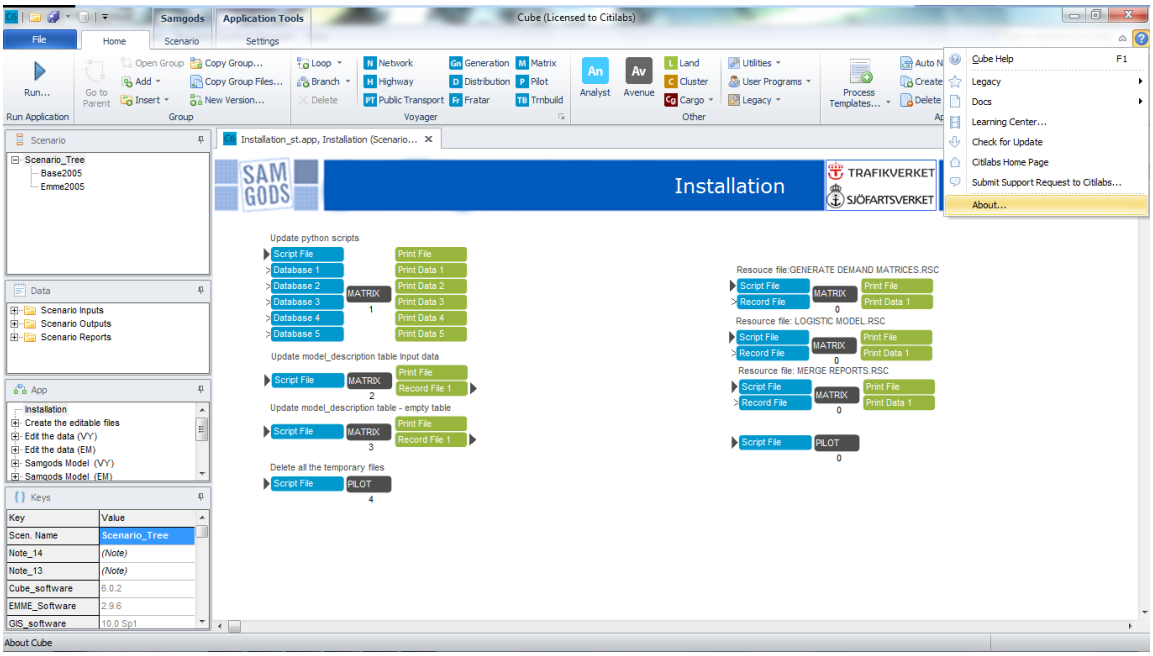


Figure 3 How to access the “About ...” information.

CITILABS
Cube 6
Current Version
Version 6.1.0 SP1 (May 01 2013)
with Report Option
BDE version 5.0.0 (Jun 21 1999)
AM version 6.1.0 SP1 (May 01 2013)
@ C:\Program Files (x86)\Citilabs\Cube
SM version 6.1.0 SP1 (May 01 2013)
@ C:\Program Files (x86)\Citilabs\Cube
GIS version 10.1.3035
Environment
Platform Microsoft Windows 7 Home Premi...
OS version 6.1.7601
Memory in use 60%
Total physical memory 3.99 GB
Free physical memory 1.59 GB
Processors 4
License
License no 9000102
Licensed to Citilabs
Maint. thru 12/2013
This product includes color specifications and designs developed by Cynthia Brewer (http://colorbrewer.org/)

Figure 4 Example of the “About ... “ window.

2. Cube Interface components

This chapter outlines the main components of the Cube Interface and explains their functions. The Cube Interface has five different windows as shown in Figure 5. When opening the model, two different user types can be selected – *model developer* or *model applier*. The *model developer* role is mainly used when setting up or installing the system, while the *model applier* role typically is used when running the model and for scenario handling. The set of active windows depends on the user role, and this manual is relevant to both types of model users.

The large area to the right is a workspace where manager windows and messages are shown, e.g., when the user wants to manage a scenario, the Scenario manager window is shown here. There are also Application manager windows and Data section manager windows. The manager windows are opened from the corresponding window on the left hand side.

For more information on the Cube interface, please refer to the Cube Help, accessed from the main toolbar: Help -> Cube Help.

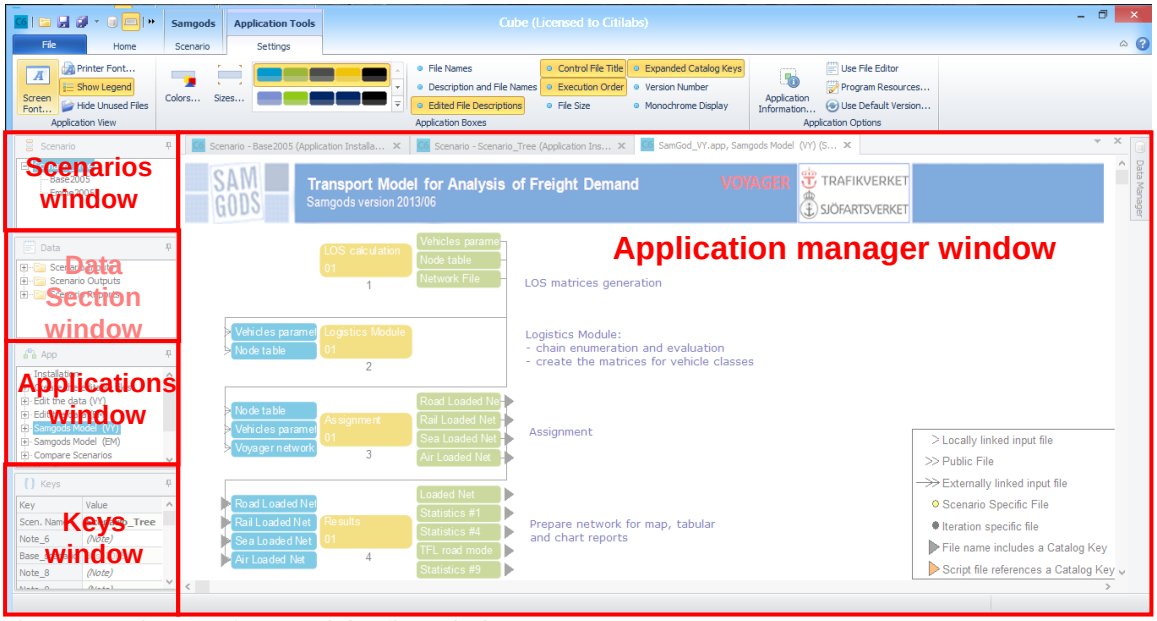


Figure 5 Cube Interface and the five windows.

2.1. Scenarios window

The purpose of the Scenarios window is to list the scenarios that exist in the model.

A *scenario* refers to a set of specific input files/values. An *application* is a group of programs. In the Samgods GUI a set of applications are defined with different types of functionalities. Different scenarios can be set up in the GUI by using the set of available applications. A scenario can be opened and managed using different applications by double-clicking on the scenario name in the Scenarios window (in model applier mode). For example, the input data and parameters to the scenario can be displayed or edited. When the scenario is open in the Scenario manager window, it is possible to select the application you want to use by the scroll down menu. Another way to open the application you want to use is to select the application in the Applications window and then double-click on the scenario in the Scenarios window. The application is then run by clicking “Run”.

The tree structure of the scenarios included in the Samgods GUI is visualized in the Scenario_Tree in the Scenarios window. The Scenario_Tree is used for scenario management.

The default base scenario is included in the Scenario_Tree and is called Base2006. In the base scenario all the input data is defined and it represents the parent for future sibling and child scenarios.

An example of a Scenario manager window for the application *Edit the data* is given in Figure 6 below.

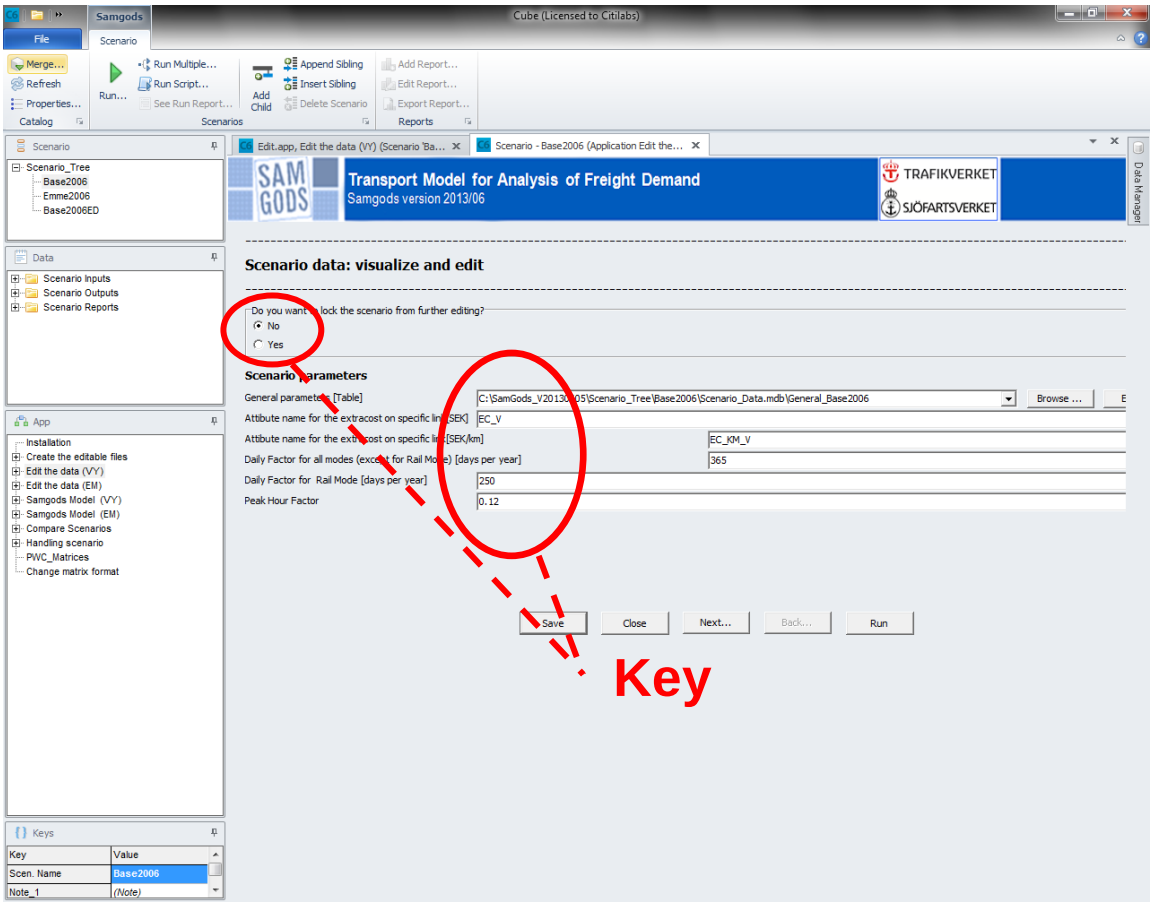


Figure 6 Example of Scenario manager window.

The keys which are possible to set values for in the Scenario manager window are strictly connected to the application selected in the Applications window. In Chapter 3, tables of keys connected to the respective applications are presented.

Tip. Open an application (in model applier mode) to set the parameters for a particular scenario by double-clicking on the scenario and select the application in the scroll down menu.

2.2. Applications window

In the Applications window all applications defined in the model catalog can be found. An *application group* is the collection of programs and sub-groups belonging to the respective application. When an application is selected (by clicking on it in the Applications window) the application group is shown in the Application manager window. In the Application manager window you can see Program boxes (e.g. MATRIX, HIGHWAY, NETWORK, and PILOT) and/or other applications (called sub-groups) belonging to the application group (see Figure 7). In the Applications window, you can see the main application at the highest level, and go through the tree structure down to lower levels.

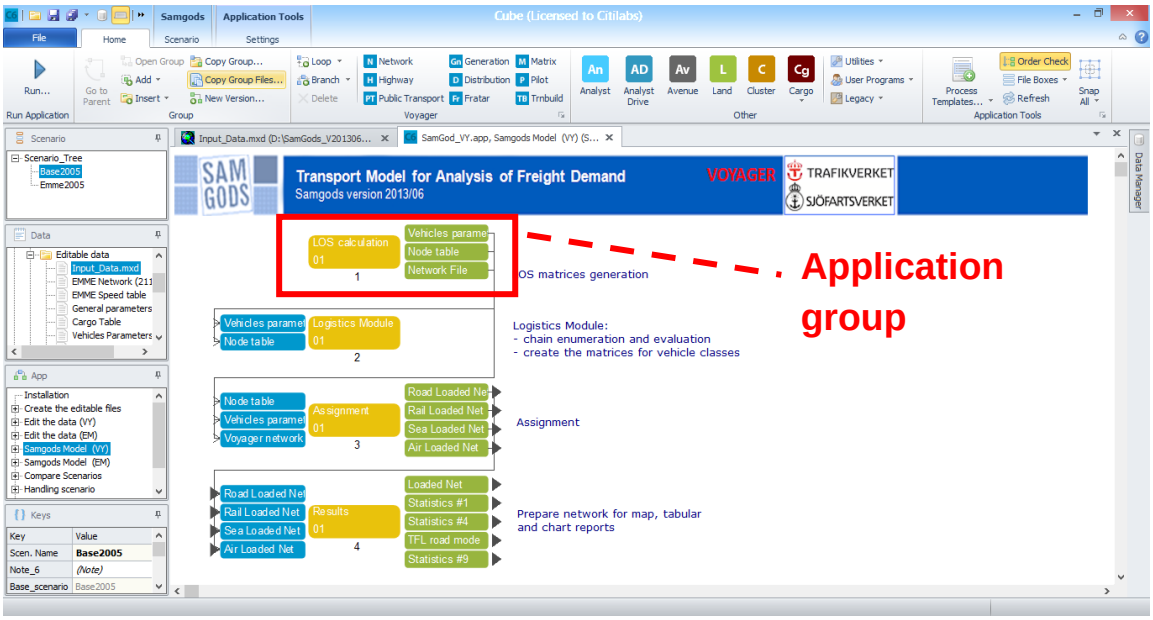


Figure 7 View of an application and its corresponding application groups.

In the Samgods GUI, the defined applications are (see the Applications window in model developer mode):

- Installation
- Create the editable files
- Edit the data (VY)
- Edit the data (EM)
- Samgods model (VY)
- Samgods model (EM)
- Compare Scenarios
- Handling Scenario
- PWC_Matrices
- Change matrix format

2.3. Data Section window

The Data Section window provides direct access to the main input and output files, which can be utilized when working with the model (editing, controlling, etc.). It allows the user to display and edit the input data, as well as to display the outputs and reports for specific scenarios and runs. In conjunction with the Scenario manager window, it enables the user to easily access all data, without needing to know where it is actually stored. The structure of the Data Section window is described in Table 2, which also shows the location of the files, the names of the tables/maps, a short description of its contents and which application that produces or uses the files.

There are three main folders in the Data Section window: Scenario Inputs, Scenario Outputs and Scenario Reports. The General tables under Scenario Inputs are always accessible from the Data Section window. The Editable data (also found under Scenario Inputs) is accessible only during the edit phase or if the user has selected not to delete the temporary geodatabase (see explanation for the *Edit the data* applications in Section **Fel! Hittar inte referenskälla.** and Section **Fel! Hittar inte referenskälla.**).

The available output in the Scenario Outputs folder depends on the choices made when running the *Samgods Model* application. The available outputs in the folder Scenario Outputs\Samgods

Report are always listed in the log report Scenario Outputs\Samgods Report\Existing Outputs. There are two other log reports except Existing Outputs: Report for the import phase and Report for the edit phase, which state any error messages or other messages from the applications *Handling scenario* and *Edit the data.* For more information on the log reports, see Table 2 and Chapter 6.

Moreover, the Data Section window includes the 11 standard reports, also called summary reports, which summarize the output from running the Samgods GUI, in Word format. The summary reports are found in the Scenario Reports folder and are listed last in Table 2. To browse to different pages in the reports, use the arrows in the main toolbar. It is possible to export the tables to Excel, by selecting the table in the Word format report, right-clicking and selecting “Export” and type in a name with an Excel file format ending. Some of the standard reports are also available as spread sheet reports in the Scenario Outputs folder, where they are marked with the same report number as in Scenario Reports (see, e.g., Scenario Outputs\Samgods Report\Logistic Module\OD Covered).

For some of the data files, the variable names that appear in the headings are explained in tables in the appendix.

Before using and analyzing any output data regarding empty vehicles/vehicle kilometres or the total number of vehicles (i.e. loaded + empty vehicles), please read the section about empty vehicles in the appendix.

The GUI allows producing different aggregations in the results. The model could produce the total number of loaded, empty and tones for all the commodity groups, or just for a specific commodity or STAN group. The outputs will be saved with different name files ending with a number of a suffix. Depending on the user choice the possible values could be:

- 0 (zero): all the commodities are aggregated, so the volumes and tons are totals
- A number among 1 and 35: a single commodity has been ran

  A subfix STAN1 to STAN12: an aggregation of results based on STAN group definition

To access at the different aggregations, e.g. different files, it is requested to set the value for catalog key “Select commodities for the Logistics module (…)” in the *Samgods Model* application to the commodity or commodity group number you want to view and clicking “Save” (please refer to Section 3.6 or 1 for more information).

Folder	**Name**	**Description**	**Used by application**
Scenario Inputs		This folder contains all the inputs for the scenarios	All
Scenario Inputs\Model Operating instructions VY	Model Operating Instructions VY	Rtf file with a short description on how to run the Samgods GUI	All (except the EMME applications)
Scenario Inputs\Model Operating instructions EM	Model Operating Instructions EM	Rtf file with a short description on how to run the Samgods GUI	All (except the Voyager applications)

Folder	Name	Description	Used by application
Scenario Inputs\General tables	Link Categories	Lookup table for the categories in the network	All
	NodeClass description	Lookup table for the numbering system (no longer required for the VY part)	All
	Transfer Type at terminals	Lookup table for the transfer type coded in the Nodes_Commodities data	*Samgods Model (VY) /(EM)*
	List and codes for modes (only visible in developer mode)	Alphanumerical codes for modes	All
	Zoning System	Lookup table for the ID_Region and ID_Country codes	All
	Modes	Lookup table for codes used for modes	All
	V101 SpeedFlow Curves	Speed flow table with parameter values for defining the delay functions for vehicle class 101 (light lorry)	*Samgods Model (VY) /(EM)*
	V102 SpeedFlow Curves	Same as previous but for vehicle classes 102-105	*Samgods Model (VY) /(EM)*
	Ranges for classes (only visible in developer mode)	For node classes from 12 to 19 the range of allowed values for node numbers	*Edit the data (VY)/(EM)*
	Default values for the frequency matrices (only visible in developer mode)	Default frequencies for different vehicle classes based on the terminal type	*Edit the data (VY)/(EM)*
Scenario Inputs\General tables\Logistics module (only visible in developer mode)	Main vehicle class for BuildChain	The main vehicle class used in the BuildChain process by mode no. (i.e. vehicle category A-U) and commodity class (P1-P35).	*Samgods Model (VY) /(EM)*

Cube Interface components

Folder	Name	Description	Used by application
	Vehicle types by chain and vessel type (ChainChoi)	List of vehicle types (VHCL_NR) by mode no. and vessel type (see table Vessel Type below) for ChainChoi	*Samgods Model (VY) /(EM)*
	Direct Access	Whether or not direct access is active by commodity type (P1-P35) and type of firm-to-firm flow (0-9, see table Type of Flow MATRIX below)	*Samgods Model (VY)/(EM)*
	Type of Flow MATRIX	Lookup table with codes for type of flow matrices	*Samgods Model (VY)/(EM)*
	List of Chains	List of Chain types	*Samgods Model (VY) /(EM)*
	Vessel Type	Lookup table with codes for vessel types	*Samgods Model (VY) /(EM)*
	Consolidation factors by chain (new)	Individual consolidation bounds for all sub modes [LB,HB]	*Samgods Model (VY) /(EM)*
Scenario Inputs\Editable data	Input_Data.mxd	General map to visualize all georeferenced data	*Edit the data (VY)/(EM)*
	EMME Network (211 format) (only visible in developer mode or for Emme users)	The Emme transport network with all link and node attributes	*Samgods Model (EM)*
	EMME Speed table (only visible in developer mode or for Emme users)	Emme speed tables	*Samgods Model (EM)*
	General parameters (only visible in developer mode)	Table with the scenario parameters catalog key settings	*Edit the data (VY)/(EM)*
	Logistics model parameters (new)	Table with logistics module parameters	*Edit the data (VY)/(EM)*
	Cargo Table	General values per commodity type	*Edit the data (VY)/(EM)*

Folder	Name	Description	Used by application
	Vehicles Parameters	General values for each vehicle type. The attribute “EMPTY_V” (1 or 0) regards whether the number of empty vehicles will be calculated (1) or not (0) (see the appendix and Section 5.4)	*Edit the data (VY)/(EM)*
	Scenario Network	Network (links and nodes) for all modes (GIS map)	*Edit the data (VY)/(EM)*
	Nodes Commodities	GIS map with all terminals and specifications on allowed transfer types and commodities per terminal	*Edit the data (VY)/(EM)*
	Nodes	GIS map of zones and terminals with values for the logistics module	*Edit the data (VY)/(EM)*
	Ports Sweden	GIS map of Swedish ports with the pilot fees by vehicle type (sea mode only)	*Edit the data (VY)/(EM)*
	Frequency network	GIS map with service frequencies (transports per week) per mode/combination of modes and origin-destination connection. For more information on the frequency network, see the appendix	*Edit the data (VY)/(EM)*
	Tax by country	Tax by country and vehicle type	*Edit the data (VY)/(EM)*
	Tax by Linkclass	Tax by link type and vehicle type	*Edit the data (VY)/(EM)*
	Tax by link	Tax for specific links by vehicle type	*Edit the data (VY)/(EM)*
	Toll bridges	Tolls for bridges per vehicle type	*Edit the data (VY)/(EM)*

Cube Interface components

Folder	Name	Description	Used by application
Scenario Inputs\EMME tables (only visible in developer mode)	Default values for the EMME macros	Labels for Emme macros	*Samgods Model (EM)*
Scenario Inputs\Others	Inzone distances – default values (only visible in developer mode)	Default values of distances within each zone (diagonal values in the distance matrices). Applied when origin and destination are in the same zone	*Samgods Model (VY) /(EM)*
	EMME (only visible for Emme users)	Path to the Emme databank (not a file, it is a location)	*Samgods Model (EM)*
	Geodatabase file for exported matrices	Location of the geodatabase file	*Change matrix format*
Scenario Inputs\PWC_Matrices	PWC matrix for commodity	Displays the PWC matrix in Voyager format for a specific commodity, see Section 3.10 for instructions	*PWC_Matrices*
Scenario Outputs\Scenario_Import_function_Report	Report for the import phase (Log report)	Report with any warnings or messages from the Scenario import function (in the *Handling scenario* application) (see Sections 3.9/4.10/ 4.11 and 6.3)	*Handling scenario*
Scenario Outputs\Edit the data Report	Report for the edit phase (Log report)	Report with any warnings or error messages from the *Edit the data* application (see Sections **Fel! Hittar inte referenskälla./Fel! Hittar inte referenskälla.** and 6.1)	*Edit the data (VY)/(EM)*
Scenario Outputs\Samgods Report	Existing Outputs (Log report)	List of available outputs in the Samgods Report folder	*Samgods Model (VY)/(EM)*

Folder	Name	Description	Used by application
Scenario Outputs\Samgods Report\LOS matrices generation	LOS Road Mode LOS Rail Mode LOS Sea Mode LOS Air Mode	LOS matrices between zones (both terminals and actual zones) per vehicle type for: time – T [hours], distance – D [km], extra costs – X [SEK], domestic distances – DD [km]	*Samgods Model (VY)/(EM)*
Scenario Outputs\Samgods Report\Logistics Module\OD Vehicles MAT	Road – Vehicle Flows Rail – Vehicle Flows Sea – Vehicle Flows Air – Vehicle Flows	OD matrices of loaded vehicle flows by mode. The sheet name indicates the vehicle type and the scenario name	*Samgods Model (VY)/(EM)*
Scenario Outputs\Samgods Report\Logistics Module\OD Tonnes MAT	Road – Goods Flows Rail – Goods Flows Sea – Goods Flows Air – Goods Flows	OD matrices in tonnes by mode. The sheet name indicates the vehicle type and the scenario name	*Samgods Model(VY) /(EM)*
Scenario Outputs\Samgods Report\Logistics Module\OD Empty Vehicles MAT	Road – Empty vehicle Flows Rail – Empty vehicle Flows Sea – Empty vehicle Flows Air – Empty vehicle Flows	OD matrices of empty vehicle flows by mode. The sheet name indicates the vehicle type and the scenario name. For important explanations of the output in terms of empty vehicles, please refer to the appendix	*Samgods Model (VY) /(EM)*
Scenario Outputs\Samgods Report\Logistics Module\OD Covered	Output by vehicle class (spread sheet for summary report no. 2: Logistics module)	Summary table with information by vehicle type (number of shipments, number of loaded vehicles, transport distance, tonnes, tonne kms, average loading factor, average distance), split up on domestic, international and total	*Samgods Model (VY)/(EM)*

Cube Interface components

Folder	Name	Description	Used by application
	Output by chain (spread sheet for summary report no. 2: LM chains)	Summary table with information by chain type (total numbers of shipments, transport distance, tonnes, tonne kms, logistic cost, average cost per tonne km), split up on domestic, international and total	*Samgods Model (VY)/(EM)*
	Loaded Demand (spread sheet for summary report no. 2: LM Demand) (new)	Summary table of the tonnes transported and the tonnes in the PWC-matrices together with success	*Samgods Model (VY)/(EM)*
	Report #5 Logistics costs at zone level (Spread sheet for summary report no. 5)	Logistics costs per zone per commodity (P01-P35) and import/export at zone level	*Samgods Model (VY/(EM)*
	Report #6 Goods flow through terminals (Spread sheet for summary report no. 6)	Goods flow (tonnes) through terminals per commodity (P01-P35) and divided by import (DAIMPORN), export (DAEXPORN) or regular (REGULARN). Regular: goods flow from and to other terminals. Import/export: goods flow with direct access from/to a zone	*Samgods Model (VY/(EM)*
	Report #7 Domestic tonne kms with container per mode (road, rail, sea, air) (Spread sheet for summary report no. 7)	Transport work (tonne kms) in Sweden for containers per commodity and mode	*Samgods Model (VY/(EM)*
	Report #8 Domestic vehicle kms with container per mode (road, rail, sea, air) (Spread sheet for summary report no. 8)	Traffic work (vehicle kms) in Sweden for containers per commodity and mode	*Samgods Model (VY/(EM)*

Folder	Name	Description	Used by application
	Report #10 Tonnes km per mode, commodity, domestic, tdomestic and international (Spread sheet for summary report no. 10)	Transport work (tonne kms) per commodity, mode and domestic/total domestic/international	*Samgods Model (VY/(EM)*
	Report #11 Tonnes per mode, commodity, domestic, tdomestic and international (Spread sheet for summary report no. 11)	Tonnes per commodity, mode and domestic/total doemastic/internation al	*Samgods Model (VY/(EM)*
	Report#12 node and link costs per vehicle and product group (Spread sheet for summary report no. 12)(new)	Link and node costs per vehicle class, per commodity and total domestic/ international	*Samgods Model (VY/(EM)*
Scenario Outputs\Samgods Report\Logistics Module\Other	TFL road mode (spread sheet for summary report no. 3)	Distribution of the time length of trips for road mode. For each time length value (TIME, increasing by 2 hours in each step), the no. of vehicles (SUM), the fraction and the accumulated fraction are listed. For a diagram, see the corresponding standard report (report no. 3 under Scenario Reports)	*Samgods Model (VY/(EM)*
Scenario Outputs\Samgods Report\Assignment	Road Assigned Network Rail Assigned Network Sea Assigned Network Air Assigned Network	GIS map with the assignment of the freight flows to the transport network per mode, in tonnes, loaded and empty vehicles per vehicle type. For important information on the empty vehicles, please refer to the appendix	*Samgods Model (VY)/(EM)*

Cube Interface components

Folder	Name	Description	Used by application
Scenario Outputs\Samgods Report\Reports	Assigned Network	GIS map with the assignment of the freight flows to the transport network with all modes in the same network, in tonnes, loaded and empty vehicles per vehicle type. For important information on the empty vehicles, please refer to the appendix	*Samgods Model (VY)/(EM)*
	Report #1 VHL and VHCLKM (Spread sheet for summary report no. 1)	Summary table of number of vehicles and vehicle kms per vehicle class and mode (split up on total/domestic and loaded/empty/all vehicles). For important information on the empty vehicles, please refer to the appendix	*Samgods Model (VY)/(EM)*
	Report #4 TONNES AND TONNESKM (Spread sheet for summary report no. 4)	Summary table of tonnes and tonne kms (domestic, international and total) per vehicle type and mode	*Samgods Model (VY)/(EM)*
	Report #9 Vehicle kms, tonne kms, empty vehicle kms and total vehicle kms per geographic region per mode (road, rail) (Spread sheet for summary report no. 9)	Summary table of vehicle kms (split up on loaded, empty and all vehicles) and tonne kms per geographic region and mode (road and rail). For important information on the empty vehicles, please refer to the appendix	*Samgods Model (VY)/(EM)*
Scenario Outputs\Compare\LOS Calculation	LOS Road Dif LOS Rail Dif LOS Sea Dif LOS Air Dif	Absolute cost differences between the current scenario and the base scenario for the LOS matrices	*Compare Scenarios*

Folder	Name	Description	Used by application
Scenario Outputs\Compare\Logistics Module\OD vehicles MAT	Road OD Dif Rail OD Dif Sea OD Dif Air OD Dif	Absolute differences in loaded vehicles between the current scenario and the base scenario for the OD matrices	*Compare Scenarios*
Scenario Outputs\Compare\Logistics Module\OD Tonnes MAT	Road TON Dif Rail TON Dif Sea TON Dif Air TON Dif	Absolute differences in tonnes between the current scenario and the base scenario for the OD matrices	*Compare Scenarios*
Scenario Outputs\Compare\Logistics Module\OD empty MAT	Road EMP Dif Rail EMP Dif Sea EMP Dif Air EMP Dif	Absolute differences in empty vehicles between the current scenario and the base scenario for the OD matrices. Please refer to the appendix for important information on the empty vehicles output	*Compare Scenarios*
Scenario Outputs\Compare\Logistics Module\Tot Gen Att	TRIPEND Road Dif TRIPEND Rail Dif TRIPEND Sea Dif TRIPEND Air Dif	Total generation (sum of each row) and attraction (sum of each column) for the vehicle OD matrices and absolute differences to the base scenario	*Compare Scenarios*
Scenario Outputs\Compare\Assignment	Compared Load Net	GIS map with absolute differences between the current scenario and the base scenario of loaded vehicles flows for all vehicle types and modes	*Compare Scenarios*
Scenario Reports (contains the summary reports)	Report_1_Tot VHC and VHCKM by VHC Type	Number of vehicles and vehicle kms: loaded, empty and all, per vehicle type. Domestic and total. For important information on the empty vehicles, please refer to the appendix	*Samgods Model (VY)/(EM)*

Cube Interface components

Folder	Name	Description	Used by application
	Report_2_Logistics Module	Summary table of no. of shipments, no. of loaded vehicles, transport distance, tonnes, tonne kms, average load factor and average distance by vehicle type, split up on domestic, total and international	*Samgods Model (VY)/(EM)*
	Report_2_LM_CHAINS	Summary table of no. of shipments, costs, kms, tonnes, tonne kms and average logistic costs per tonne km, by transport chain type	*Samgods Model (VY)/(EM)*
	Report_2_LM_DEMAND (new)	Summary table of the tonnes transported and the tonnes in the PWC-matrices together with success rate	*Samgods Model (VY)/(EM)*
	Report_3_TFL_Distribution	Trip time length distribution for road mode. Number of vehicles making trips lasting 2, 4, 6, ... hours	*Samgods Model (VY)/(EM)*
	Report_4_Tot TONNES and TONKM by VHC type	Summary table of tonnes and tonne kms (split up on domestic, international and total) for each vehicle type	*Samgods Model (VY)/(EM)*
	Report_5_Total logistic cost at zone-level	Total logistics costs per commodity type (P01-P35) split by import and export at geographical zone level	*Samgods Model (VY)/(EM)*

Folder	Name	Description	Used by application
	Report_6_Goods flow through terminals (number of tonnes in and out per year)	No. of tonnes through terminals (described as zones) per P01-P35 and whether the goods flow is import, export or regular. Regular refers to goods flows between terminals. Import/export refers to goods flows with direct access from/to a zone	*Samgods Model (VY)/(EM)*
	Report_7_Domestic tonne kms with container per mode (road, rail, sea, air)	Domestic tonne kms with container per mode, split by commodity and total	*Samgods Model (VY)/(EM)*
	Report_8_Domestic vehicle kms with container per mode (road, rail, sea, air)	Domestic vehicle kms with container per mode, split by commodity and total	*Samgods Model (VY)/(EM)*
	Report_9_Vehicle kms and Tonnes kms per geographic region	Vehicle kms (for loaded, empty and all vehicles) and tonne kms per geographical region (road and rail mode). For important information on the empty vehicles, please refer to the appendix	*Samgods Model (VY)/(EM)*
	Report_10_Transport work (tonne kms) per mode, total and split per commodity, domestic, tdomestic and international	Transport work (tonne kms) per mode and commodity, as well as domestic, total domestic or international	*Samgods Model (VY)/(EM)*
	Report_11_ Transported goods volume per mode, total and split per commodity, domestic, tdomestic and international	Transported goods (in tonnes) per mode and commodity, as well as domestic, total domestic or international	*Samgods Model (VY)/(EM)*
	Report_12_node and link costs per vehicle and product group (new)	Node and link costs per vehicle type and product group, divided in total domestic and international	*Samgods Model (VY)/(EM)*

Table 2 List of inputs and outputs accessible from the Data Section window.

2.4. Keys window

When we look at the GUI, applications present in there represent calculations and formulas we will apply to the input data. The key window allows to access to all the input data that could vary in different executions applying the same calculations defined in the application. So a e general definition of a key is *a varying input to an application*. For instance using a key it is possible to specify different values for a parameter, different networks for the LOS calculation and assignment, different control parameters for the Logistics Module or more.

In general terms the keys may serve different purposes in summary:

- To manage input data
- To give general settings for the model
- To enable different ways to run the model

A key can for example be:

- The name of an input data file
- A directory
- A check box with true or false value
- A check list to choose a specific value
- A constant
- A radio button

Different kinds of keys appear in applications and other places where it is possible to select the settings.

In Chapter 3, the available catalog keys for each specific application are listed. Catalog keys are defined as keys for setting up parameters in the applications. The Keys window is available in developer mode and it is also possible to display from Main toolbar -> Scenario -> View -> Show Keys.

The following keys in the Cube interface are called system keys:

- {CATALOG_DIR} is the directory where the .cat file is located
- {SCENARIO_DIR} is the directory where the scenario folder is located
- {SCENARIO_CODE}, {SCENARIO_SHORTNAME) are defined in the Scenario Properties, see Figure 9 below
- {SCENARIO_FULLNAME} = {SCENARIO_SHORTNAME_PARENT}.{SCENARIO_SHORTNAME}, where {SCENARIO_SHORTNAME_PARENT} is the base scenario to the current scenario

These keys are important components in each scenario. Please refer to the online Cube Voyager help available from the menu bar for further information (see for instance Scenario Manager > Working with applications and catalogs > Cube Voyager and TP+ scripts). “Scenario properties” is accessed by right-clicking on the topical scenario in the Scenarios window and select “Properties” (see Figure 8).

Each time a scenario is created all catalog keys should be given a value. Some of the keys have a default value. If the default value is changed by the user, it will become specific for that scenario. When a scenario is created as the child to another scenario, it will inherit all the catalog key settings from the parent.

In the Keys window information on the origin of the keys can be found. The keys for a specific scenario and application can be viewed by selecting the scenario in the Scenarios window by

clicking on it, and selecting the application in the Applications window in the same way. The keys marked in black in the Keys window are undefined. The keys are shown in bold font if they have been explicitly defined by the user and in italics if they have been inherited from the parent scenario. If the value is in grey font, it is a default value that has not been changed by the user, neither for the current scenario, nor for its parent.

More information about the keys and the scenarios can be found in the Cube Help, accessed from the main toolbar (Help -> Cube Help -> Cube Base -> Scenario Manager -> Keys/Scenarios).

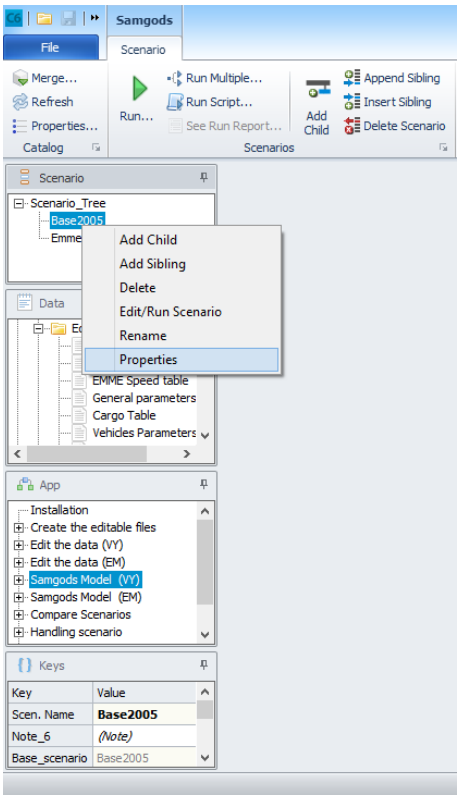


Figure 8 How to open the “Scenario Properties” window.

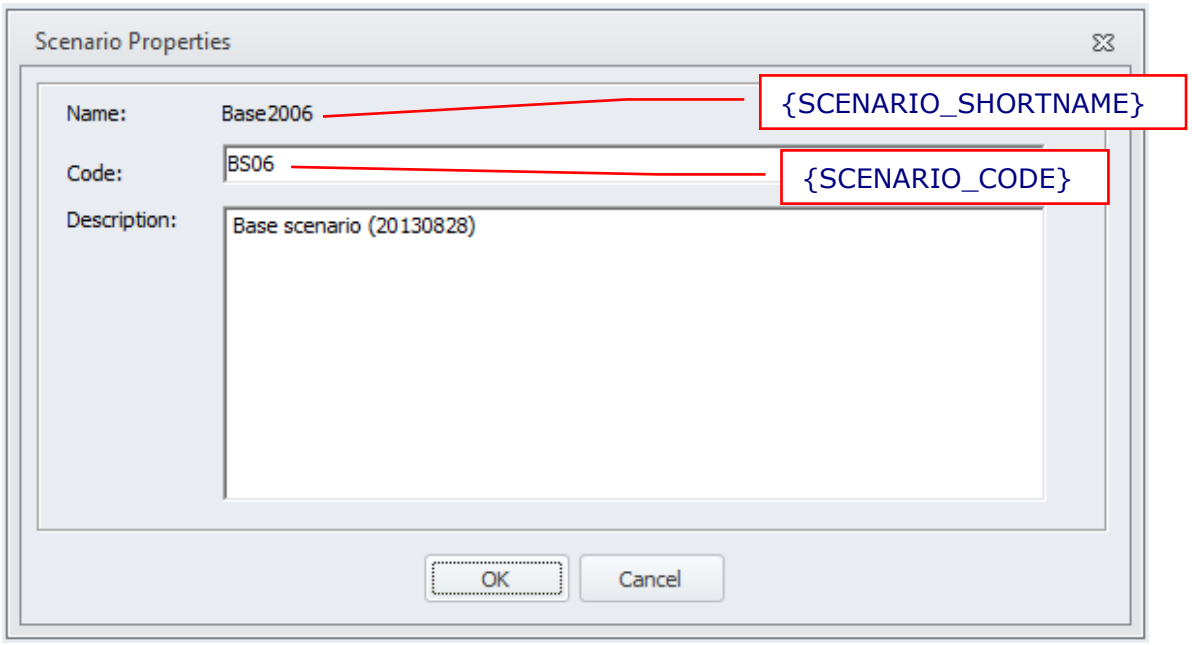


Figure 9 Set {SCENARIO_SHORTNAME} and {SCENARIO_CODE} in “Scenario Properties”.

2.5. Application manager window

The Application manager window is accessed by double-clicking on an application in the Applications window, and it provides a flow chart of a transportation modelling process, see Figure 10. The view is in a hierarchical flow style that offers:

- a view of the individual processes, the flow of data from one application to another, the sequence in which the processes are run
- a clear structure of what the input data and the output data are in each process
- a convenient interface for running specific parts of the process or the whole model

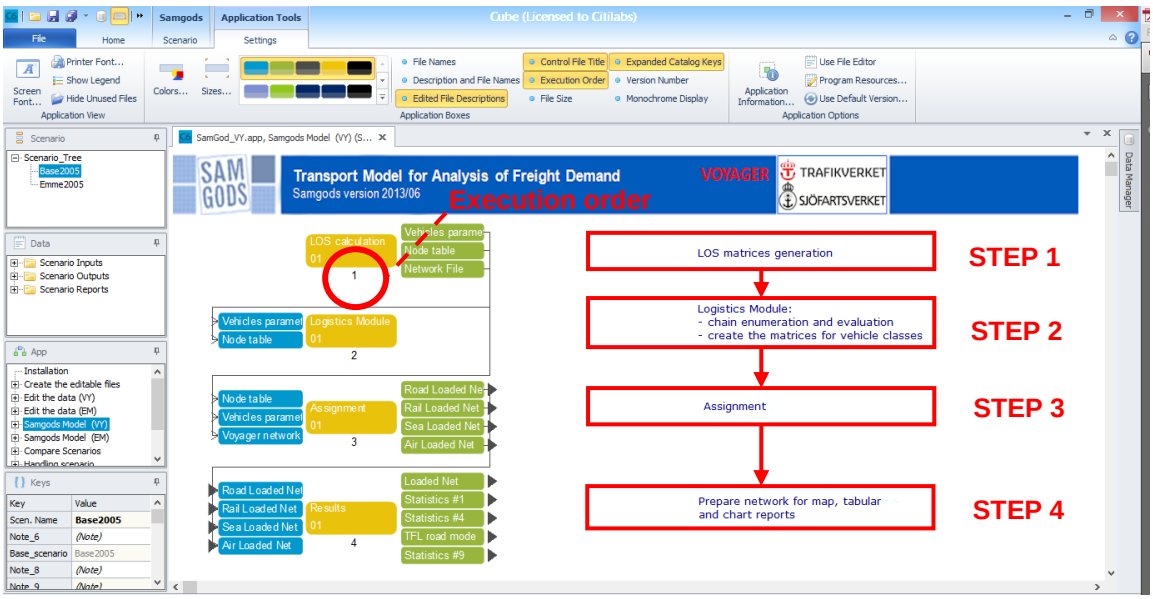


Figure 10 Application manager window.

2.6. Task Monitor program and the help function

The *Task Monitor program* is started automatically from the Application manager when the user runs either a single program or an application. The main purpose of the Task Monitor is to report the progress of the program/application execution, and to allow control of the run by pausing or abandoning it. When a run finishes successfully, a message box will indicate that the run is finished without any problem. If a failure occurred, a dialog box, showing the return code and error information, will appear.

The return code from the process gives the information on how the run completed. The codes are shown below.

Return codes:

Return code = 0 – the run completed successfully

Return code = 1 – along the process, a few warning messages were printed but the run was completed successfully

Return code = 2 – the run ended with a fatal error

Return code = 3 – the process was aborted by the user

There are facilities that allow showing:

- The report for the whole run
- The report for the step that failed, if the run ended with a fatal error

For more details on the Task Monitor, see reference guide RG_CubeBase.pdf under Citilabs\Cube folder, Chapter 16.

When the user needs help about the Cube Interface, the help function can be consulted. It is found on the Menu Bar Help -> Cube Help.

3. Description of the applications

This chapter introduces the different applications in the Samgods GUI, how they are used and how the settings are made. The chapter is written as a catalog with detailed descriptions of the applications and should be consulted for the specifications of the applications rather than for instructions on how to use the entire Samgods model. For instructions on how to get started with Samgods, how to create and use scenarios etc., please refer to Chapter 4. The chapter commences with an explanation of the different Model User roles, followed by the description of the applications in the Samgods model GUI.

3.1. Model User roles

In the Samgods model GUI, two Model User roles are available model applier and model developer. In general, applier mode should be used by the normal user when setting up scenarios and running the model. Developer mode should in general be used when advanced system settings are made, for instance when administrating the system by making installations and setting up the system. In the catalogue key tables in this chapter, the model user rights are indicated. Model applier is indicated when the key can be accessed in applier mode (even though it could be accessed also in the model developer mode). Model developer is indicated when the key concerns system settings, or when only the developer has access to the key.

As mentioned earlier, the Model User roles are set by right-clicking on the Samgods.cat label and selecting “Properties”. On the Catalogue Properties window, select the “Model User” tab, where the settings for the Model User roles are made. More details for when the Model User roles are used are given in the catalog key tables. Most of the catalog keys for the respective applications are described however, not all keys are explicitly explained. Two of the applications (*Edit the data* and *Samgods Model*) are available in two versions, depending on whether Voyager or Emme is used as the supply model.

General guidelines for which Model User role to use:

Model applier – should be used by the normal user when running different scenarios

Model developer – should be used when setting system keys.

3.2. *Installation* application

The *Installation* application is only enabled in developer mode. A screenshot of the application is displayed in Figure 11. The purpose of the *Installation* application is to set the general information to properly run different programs involved in the model. In particular we have the following programs:

- Logistics module (executable programs buildchain.exe and chainchoi.exe)
- Citilabs Cube Software
- ArcGIS Esri Software
- Python software
- Emme software

See the installation instructions in Section 1.7 for further details on how to access the keys and set the right values.

The first group of catalog keys, called “Software versions”, is introduced to avoid inconsistency of version problems over time. Different versions of the programs can be implemented (typically

when a software is updated to a newer version), and it is important to know which software versions that were used for a particular scenario study to enable proper analysis and consistency of the outcome. The keys are displayed in Table 3.

Catalog key name	**Example of value**
Cube Software	6.1.0 Sp1
EMME Software	3.3.4
ArcGIS Software	10.1 Sp1
Python software	27
Samgods Model software	(20140317)

Table 3 “Software versions”.

The second group of catalog keys, “Installation parameters”, handles the possible problem of having different installation folders on different PC’s by setting the path of the programs. Since the path for the ArcGIS program is used by Python, the “\” signs must be replaced by “/” or “\\” in this key, see Table 4 for an example.

Catalog key name	**Example of value**
Location of Cube Program	C:\Program Files\
Location of EMME Program	C:\Program Files\
Location of ArcGIS Program	C:/Program Files/
Location of Python Program	C:\Python27\ArcGIS10.1

Table 4 “Installation parameters”.

The last key in the second group, see Table 5 below, defines the base scenario that is used in the current model. The base scenario is used as a reference when storing the data for other scenarios. Only the differences between the base scenario and other scenarios are stored in the database. The value of this key is related to the *Handling scenario* application please refer to Section 3.9 for more information.

Catalog key name	**Example of value**
Scenario name for the BASE scenario	Base2006

Table 5 Base scenario definition.

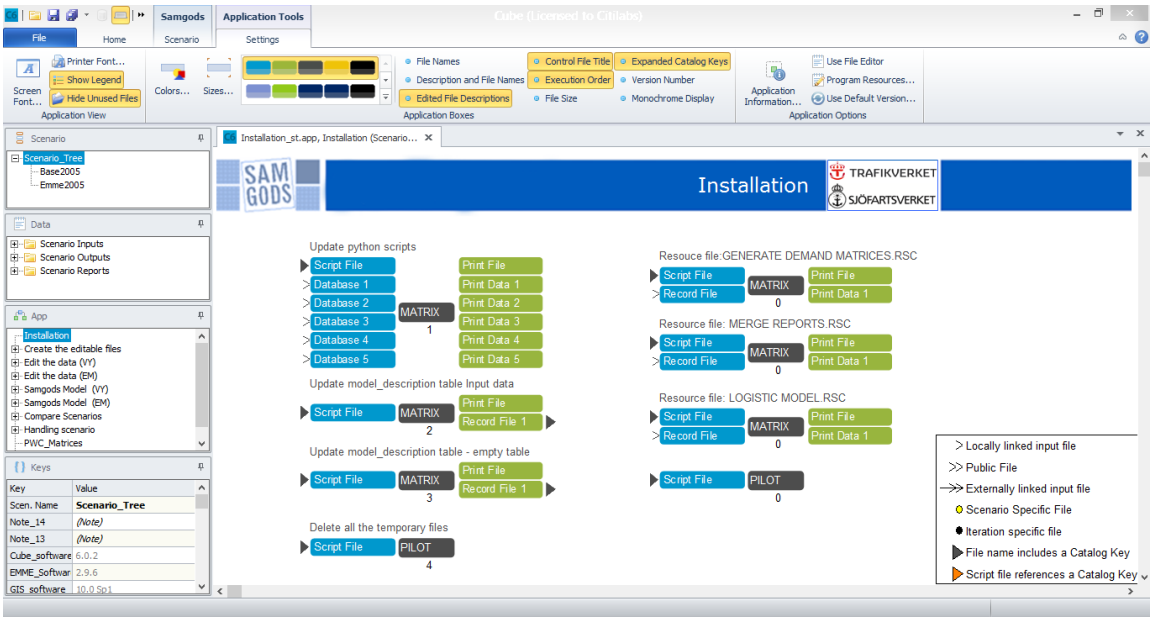


Figure 11 The Installation application.

To open the overview of the application as illustrated in Figure 11 double-click on the application. To access the catalog keys of a specific scenario, mark the application, and double-click on the specific scenario in the Scenario window. Please refer to Chapter 3 for further instructions on how to use the Samgods GUI.

3.3. Create the editable files application

A view of the *Create the editable files* application can be seen in Figure 13. The purposes of this application are to:

- Create the essential files for visualizing or editing the input data from the graphical user interfaces (Cube GIS window, DBI editor)
- For a new scenario, allow to copy all the parent scenario data to the new scenario

The concept of this is that all the input data connected to a specific scenario is stored in the database as the differences between the current scenario and the base scenario (i.e., the reference scenario). The benefits of this are:

- A smaller amount of data is stored, that is, only the differences between the base scenario and the alternative scenario(s)
- It makes different alternative scenarios independent of each other, by letting the alternative scenarios having only the base scenario as a reference. The only redundancy of the system occurs when children are added to an alternative scenario since all scenarios (including child and parent scenarios) are independent of each other and only have the base scenario as a reference
- When changes are made to the base scenario, there is no need to change all the other scenarios. This facilitates the handling of the overall scenarios. Furthermore the changes and edits will be done only once, in the base scenario, avoiding the risk of made mistakes when updating the correlated scenarios

To create the editable files for a specific scenario and the scenario specific tables, two applications work in conjunction:

- the *Create the editable files* application, that merges the base scenario with the scenario specific tables to view and edit a scenario, and
- the *Edit the data* application, that stores the scenario-specific tables into the database after any edits have been made.

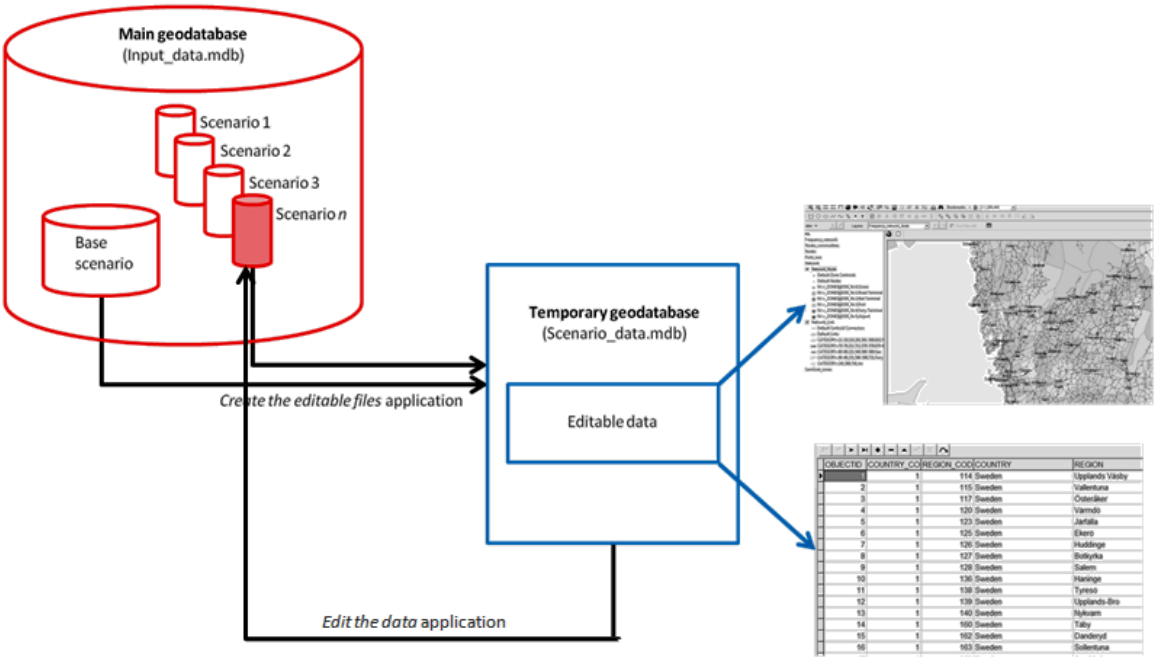


Figure 12 Database structure and scenario data of the Samgods GUI.

The main database is always present in the model, in the 05_Input_data folder (see Table 1 in Section 1.7). The temporary database (Scenario_data.mdb) is created in the scenario folder in each run of this application and is deleted on request by the user. The temporary database can also be viewed in the GUI.

The catalog keys available in the *Create the editable files* application are shown in Table 6 below.

	Catalog key name	**Example of value**	**Model User's rights**
1	Which scenario do you want to copy as new scenario? (Default is Base2006)	Base2006	Applier
2	Location of Python program	C:\Python27\ArcGIS10.1	Developer
3	Scenario name for the BASE scenario	Base2006	Developer

Table 6 *Create the editable files* catalog keys.

The first key is relevant during the creation of a new scenario. When the scenario already exists, no action is needed. The last two keys are for installation purposes only. After the *Installation* application has been run, no action is required.

To create a new scenario, the application copies the scenario-specific tables from the scenario (as indicated in the first catalog key in Table 6) and stores them in the temporary database. The *Edit the data* application will then store them back to the main database.

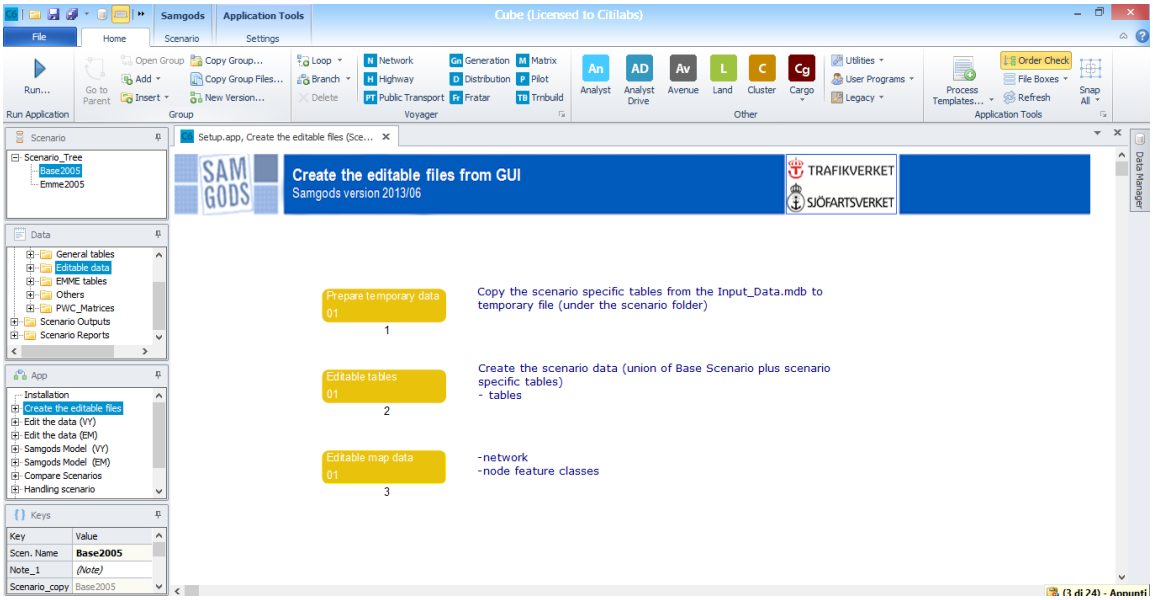


Figure 13 The Create the editable files application.

When the application has been executed, the output (i.e., the editable files) can be found in the folder Scenario Inputs\Editable data in the Data Section window. If the *Create the editable files* application has been executed before and the user after that has not selected to delete the temporary geodatabase, all the data will be available without the need to run the application again. If the temporary database has been deleted, it may always be reconstructed by running the *Create the editable files* application.

Please note: This application has to be run at least once for each scenario, including the base scenario. Otherwise, the necessary files for using the scenario will not be created.

The *Create the editable files* application is the only application that is necessary to run for *each* scenario - including the base scenario. For all scenarios other except the base scenario it is also necessary to run the *Edit the data* application.

Tip: The date and time of the last modification in of the temporary and the main geodatabase are checked by the application to avoid inconsistencies between the two datasets. If any differences are found, the user is asked to choose whether the execution should be completed (the temporary geodatabase will then be overwritten) or cancelled, so that the temporary geodatabase could be saved to the main geodatabase by the user.

Please note:

- The location of the main database is in the 05_Input_data folder (see Table 1 in Section 1.7).
- The location of the temporary database, Scenario_data.mdb, is in the scenario folder, which can be found in the Scenario_Tree folder (see Table 1 in Section 1.7). It is available after each run. It can also be viewed from the GUI.

3.4. Edit the data (VY) application

The *Edit the data (VY)* application should be used if changes to the input data are made in Voyager. The Voyager applications are only displayed if the settings in the Catalog Properties indicate that the user is a Voyager user (please refer to Section 4.2). If you are an Emme user, please refer to Section **Fel! Hittar inte referenskälla.**.

A view of the application is shown in Figure 14. The purposes of the application are to:

- Enable editing of the scenario data by using the Scenario manager window or the Data Section window. All georeferenced data is visualized using the GIS Cube window and the other data is displayed in a database window. See the reference guide for Cube Base (RG_CubeBase.pdf under Citilabs\Cube folder) for further information on these tools
- Store the modified data (the scenario-specific tables) to the main database after editing

The catalog keys are ordered in two steps. The first ones are shown in Table 7 below

	Catalog key name	**Example of value and explanation of values**	**Description**	**Model User's rights**
1	Do you want to lock the scenario from further editing?	Yes	This key is introduced due to data security reasons, where the user can choose to lock the scenario from further editing. Further explanation is given below	Applier
2	General parameters [Table]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\General_Base2006	This is the scenario data for the scenario, generated by the system	Developer
3	Attribute name for extra cost on specific link [SEK]	EC_V	Please refer to Section 5.1 for further explanation	Applier
4	Attribute name for extra cost on specific link [SEK/km]	EC_KM_V	Please refer to Section 5.1 for further explanation	Applier
5	Daily factor for all modes (except for Rail Mode) [days per year]	365	This key represents a value used to convert the annual flows into hourly flows and is expected to be changed rarely	Developer

6	Daily factor for Rail Mode [days per year]	250	This key represents a value used to convert the annual flows into hourly flows and is expected to be changed rarely	Developer
7	Peak Hour Factor	0.12	This key represents a value used to convert the annual flows into hourly flows and is expected to be changed rarely	Developer
8	General parameters for Logistic Module [Table] (new)	C:\SamGods\Scenario_Tree\Base2006\Scenario_Data.mdb\LogMod_Base2006	This is the Logistic Module data for the scenario, generated by the system	Developer
9	Interest rate used in cost calculation [%/year] (new)	0.1	Interest rate used in cost calculations [%/year]	Applier
10	Stuffing cost [SEK per tonne] (new)	18	Stuffing cost [SEK per tonne]	Applier
11	Number of transport chain solutions for the Logistics module	1: the optimal solution 2: the second best solution … 5: the fifth best solution	Please refer to Table 5.2 in “Program documentation for the logistics model for Sweden” (see References). The output is found in the Data Section window, in Scenario Inputs/Editable data/ General parameters table, in the field DATA. In the current implementation only the optimal solution is implemented	Applier
12	Output variables for the optimal transport solution [e.g.1,2,3, max is 8]	1: direct access 2: (un)loading costs 3: wait time costs 4: main utilization rate 5: number of vehicles 6: detailed information (total cost, total distance, total times, commodity, etc.) per chain type	Please refer to Table 5.2 in the “Program documentation for the logistics model for Sweden” (see References). The output files are found in the scenario folder (see Table 1), in LogMod\ChainChoi\OUTPUT and could be consulted by the advanced user	Applier

		7: detailed information (transport cost share, total distance, total times, mode, etc.) per OD-leg 8: Statistics of the avail function Max is 8.		
13	Initial consolidation factor in BuildChain (1 iteration)	0.75	This key concerns which consolidation factor (for all modes) that should be used in BuildChain. Please refer to the Method Report (see the References, Chapter 8)	Applier
14	ALL_LORRY_TYPE_CONSOL (new)	Yes	This key will enable the consolidation of all lorries if the value is Yes. With No the implementation will be the same as previous Logistic module version	Applier
15	INDIVIDUAL_OD_LEG_OPTIMIZE (new)	Yes	If true then each chain is evaluated one leg at a time, and the lowest cost vehicle is chosen. The exception is legs rolling on and off a RoRo vessel, where the previous, recursive optimization method is used for the three legs rolling on – roro – rolling off.	Applier
16	MINIMUM_ANNUAL_TONNE_DEMAND_4_FREQ_OPTIMIZE [tonnes] (new)	10	If (Annual Demand / Nr Relations) < MINIMUM_ANNUAL_TONNE_DEMAND_4_FREQ_OPTIMIZE ChainChoi will exit 20 step frequency optimization loop	Applier

			after the first iteration, where frequency corresponds to EOQ.	
17	Low bound for consolidation factor [Tonnes] (new) (applied to all commodities)	0.05	Lower bound bounds for the consolidation factors ranking output	Applier
18	Upper bound for consolidation factor [Tonnes] (new) (applied to all commodities)	0.95	Upper bound bounds for the consolidation factors ranking output	Applier
19	TONNES (new)	DYNAMIC_MAX	Parameter to control how the demand shall be used in the calculation of the shipment sizes on annual flow. Following values are allowed: DYNAMIC, DYNAMIC_MAX DYNAMIC_AVERAGE, DYNAMIC_GEOMEAN	Applier
20	Do you want to log parameters from control files? (new)	Yes	If true the parameters from control file are logged in log file (under LOG folder).	Applier
21	Do you want to log reading of input data? (new)	Yes	If true the input data phase is logged in log file (under LOG folder).	Applier
22	Do you want to log cost values from vehicles files? (new)	Yes	If true the cost values read from LOS files are logged in log file (under LOG folder).	Applier
23	Do you want to delete the temporary geodatabase? (Tick=yes)	Tick =yes	This key gives the user the possibility to save hard disk space by deleting the temporary geodatabase	Applier

			(Scenario_Data.mdb). However, by keeping the temporary files, there is no need to run the *Create the editable files* application again (for the current scenario)	

Table 7 Scenario parameters and handling keys.

The first key (lock the scenario or not) is introduced due to data security reasons. The user can choose to lock the scenario from further editing. A new scenario is always editable, because it is expected that the user needs to change some scenario tables. To lock a scenario means that after the run, all the scenario data can be visualized in the interface, but if any edits are made, these edits will not be saved in the main geodatabase. The base scenario is locked by default, and it should always be locked to enable comparison of the scenarios. In the database, only the relative differences between the base scenario and the scenarios (alternatives) are stored, why it is important not to change the base scenario when new scenarios have been introduced. The other scenarios could be locked or not, depending on the user's choices. A prompt window gives information whether the scenario is locked or not during the execution of the following applications: *Create the editable files*, *Edit the data (VY)*, *Edit the data (EM)*, *Samgods Model (VY)*, *Samgods Model (EM)*.

The last key (no. 23) gives the user the possibility to reduce the run time during the creation of the temporary files. By deleting the temporary geodatabase, hard disk space could be saved. However, by keeping the files, run time can be saved since the *Create the editable files* application does not have to be run again for the specific scenario. The *Create the editable files* application needs about 5-10 minutes to merge all scenario specific tables with the base scenario.

To avoid inconsistencies between the temporary and the main geodatabase, it is recommended to always control whether the two data sets have the same date and time of last modification, before running the *Samgods Model.* If they differ, there could be edits in the temporary geodatabase that have not been saved to the main geodatabase (by running the *Edit the data* application) and will not be included in the execution of the model. For the *Create the editable files* application, this check is done by the application, in order not to overwrite any not saved edits in the temporary geodatabase by mistake (see Section 3.3).

When "Next" is clicked in the *Edit the data (VY)* application in the applier mode, a second set of catalog keys is displayed, see Table 8. These keys give access from the interface to all the input data for the specific scenario. The model applier does not need to do anything to define the key values. The tables and geodata can be edited by clicking on the "Edit…" button in applier mode. All these files are also accessible from the Data Section window, under Scenario Inputs\Editable data. In Section 2.3 a brief explanation of all files in the Data Section window is given.

Catalog key name	**Example of value**	**Model User's rights**	**Name of file in Data Section window**
ArcMap GIS Project File	C:\Samgods\Scenario_Tree\Base2006\Input_Data.mxd	Applier	Input_Data.mxd
Commodity data [Table]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Cargo_Base2006	Applier	Cargo Table
General parameters of Vehicle Classes [Table]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Vehicles_Parameters_Base2006	Applier	Vehicles Parameters
Table with tax by country (SEK/km) [Table]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Tax_Country_Base2006	Applier	Tax by country Table
Tax by Category (SEK) [Table]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Tax_Category_Base2006	Applier	Tax by Linkclass
Tax by Link (SEK) [Table]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Tax_Link_Base2006	Applier	Tax by link
Toll for bridges (SEK) [Table]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Toll_Link_Base2006	Applier	Toll bridges
Network specific of scenario [Geodata]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Network	Applier	Scenario Network
Port terminals (pilot fees values) [Geodata]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Ports_Swe	Applier	Ports Sweden
Zones and terminals attributes [Geodata]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Nodes	Applier	Nodes
Nodes commodities (interchanges allow) [Geodata]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Nodes_commodities	Applier	Nodes commodities
Frequency data [Geodata]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Frequency_network	Applier	Frequency network

Table 8 Editable data.

The last two catalog keys are only accessible in model developer mode. They define the base scenario and the folder for the Python program, see Table 9.

Catalog key name	Example of value	Model User's rights
Location of Python Program	C:\Python27\ArcGIS10.1	Developer
Scenario name for the BASE scenario	Base2006	Developer

Table 9 Developer keys.

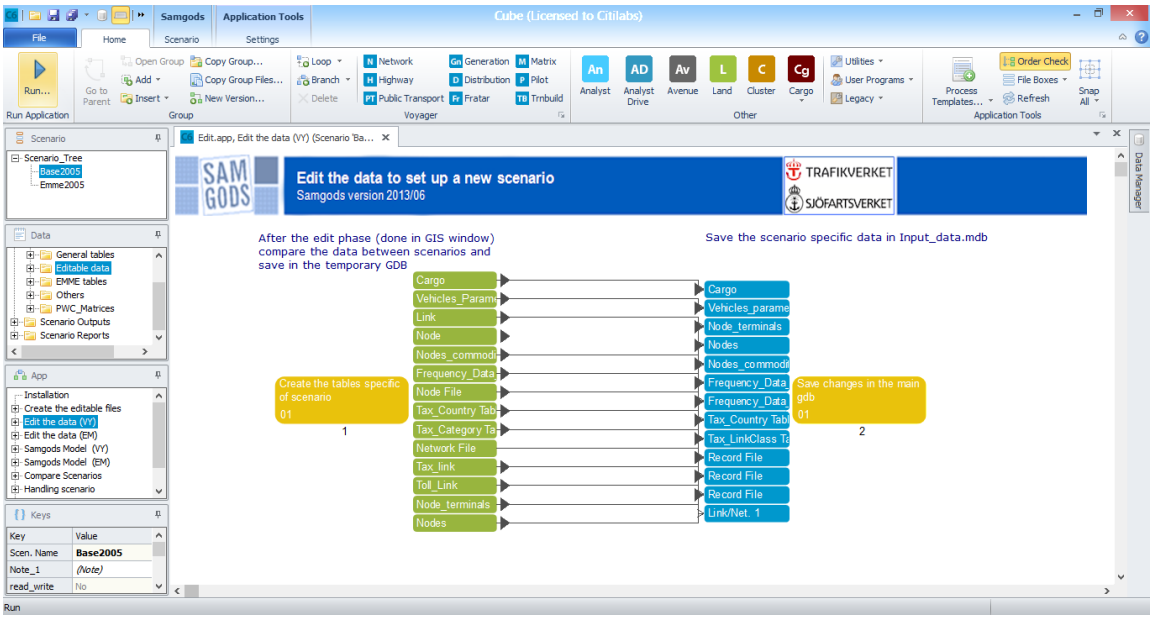


Figure 14 The *Edit the data (VY)* application.

The output of the *Edit the data (VY)* application, a log report containing information on the execution of the application, can be found in the folder Scenario Outputs\Edit the data Report in the Data Section window. This file contains a list of numbered messages giving information on, e.g., whether any data is missing in the input data (e.g. a missing port in the ports_swe table). For a list of messages, see the Chapter 6.

> ***Please Note!*** This application has to be run at least once for every scenario as Voyager user– except the base scenario, if no changes are made.

3.5. Edit the data (EM) application

This application should be used instead of the *Edit the data (VY)* application if changes to the input data are made in Emme. The Emme applications are only displayed if the settings in the Catalog Properties indicate that the user is an Emme user (please refer to Section 4.2). If you are a Voyager user, please refer to Section **Fel! Hittar inte referenskälla.**.

A view of the application can be seen in Figure 15. The purposes of the application are:

- Enable editing of the scenario data using the Scenario manager window or the Data Section window. All georeferenced data is visualized using the GIS Cube window and the other data is displayed in a database window. See the reference guide for Cube Base (RG_CubeBase.pdf under Citilabs\Cube folder) for further information on these tools
- Import the changes using ascii files, if the changes in the network data have been made in Emme
- Store the modified data (the scenario specific tables) to the main database after editing

The catalog keys are ordered in two steps. The first ones are shown in Table 10 below.

	Catalog key name	**Example of value**	**Description**	**Model User's rights**
1	Do you want to lock the scenario from further editing?	Yes	This key is introduced due to data security reasons, where the user can choose to lock the scenario from further editing. Further explanation is given below	Applier
2	General parameters [Table]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\General_Base2006	This is the scenario data for the base scenario generated by the system	Developer
3	Attribute name for extra cost on specific link [SEK]	EC_V	Please refer to Section 5.1 for further explanation	Applier
4	Attribute name for extra cost on specific link [SEK/km]	EC_KM_V	Please refer to Section 5.1 for further explanation.	Applier
5	Daily factor for all modes (except for Rail Mode) [days per year]	365	This key represents a value used to convert the annual flows into hourly flows and is expected to be changed rarely	Developer

6	Daily factor for Rail Mode [days per year]	250	This key represents a value used to convert the annual flows into hourly flows and is expected to be changed rarely	Developer
7	Peak Hour Factor	0.12	This key represents a value used to convert the annual flows into hourly flows and is expected to be changed rarely	Developer
8	General parameters for Logistics Module [Table] (new)	C:\SamGods\Scenario_Tree\Emme2006\Scenario_Data.mdb\LogMod_Emme2006	This is the Logistic Module data for the scenario, generated by the system	Developer
9	Interest rate used in cost calculations [%/year](new)	0.1	Interest rate used in cost calculations [%/year]	Applier
10	Stuffing cost [SEK per tonne](new)	18	Stuffing cost [SEK per tonne]	Applier
11	Number of transport chain solutions for the Logistic Module	1: the optimal solution 2: the second best solution … 5: the fifth best solution	Please refer to Table 5.2 in "Program documentation for the logistics model for Sweden" (see the References). The output is found in the Data Section window, in the Scenario Inputs/Editable data/ General parameters table, in the field DATA. In the current implementation only the optimal solution is implemented	Applier
12	Output variables for the optimal transport solution [e.g.1,2,3, max is 8]	1: direct access 2: (un)loading costs 3: wait time costs 4: main utilization rate 5: number of vehicles 6: detailed information (total cost, total distance, total times, commodity, etc.) per chain type 7: detailed information (transport cost share, total distance, total times,	Please refer to Table 5.2 in the "Program documentation for the logistics model for Sweden" (see References). The output files are found in the scenario folder (see Table 1), in LogMod\ChainChoi\ OUTPUT and could be consulted by the advanced user	Applier

		mode, etc.) per OD-leg 8: Statistics of the avail function Max is 8.		
13	Initial consolidation factor in BuildChain (1 iteration)	0.75	This key concerns which consolidation factor (for all modes) that should be used in BuildChain. Please refer to the Method Report (see References)	Applier
14	ALL_LORRY_TYPE_CONSOL (new)	Yes	This key will enable the consolidation of all lorries if the value is Yes. With No the implementation will be the same as previous Logistic module version	Applier
15	INDIVIDUAL_OD_LEG_OPTIMIZE (new)	Yes	If true then each chain is evaluated one leg at a time, and the lowest cost vehicle is chosen. The exception is legs rolling on and off a RoRo vessel, where the previous, recursive optimization method is used for the three legs rolling on – roro – rolling off.	Applier
16	MINIMUM_ANNUAL_TONNE_DEMAND_4_FREQ_OPTIMIZE [tonnes] (new)	10	If (Annual Demand / Nr Relations) < MINIMUM_ANNUAL_TONNE_DEMAND_4_FREQ_OPTIMIZE ChainChoi will exit 20 step frequency optimization loop after the first iteration, where frequency corresponds to EOQ.	Applier
17	Low bound for consolidation factor [Tonnes] (new) (applied to all commodities)	0.1	Lower bound bounds for the consolidation factors ranking output	Applier
18	Upper bound for consolidation	0.95	Upper bound bounds for the consolidation factors ranking output	Applier

	factor [Tonnes] (new) (applied to all commodities)			
19	TONNES (new)	DYNAMIC_MAX	Parameter to control how the demand shall be used in the calculation of the shipment sizes on annual flow. Following values are allowed: DYNAMIC, DYNAMIC_MAX DYNAMIC_AVERAGE, DYNAMIC_GEOMEAN	Applier
20	Do you want to log parameters from control files? (new)	Yes	If true the parameters from control file are logged in log file (under LOG folder).	Applier
21	Do you want to log reading of input data? (new)	Yes	If true the input data phase is logged in log file (under LOG folder).	Applier
22	Do you want to log cost values from vehicles files? (new)	Yes	If true the cost values read from LOS files are logged in log file (under LOG folder).	Applier
23	Select from which interface you want to import your edits:	Emme option 1 (emme network and speed tables)	If option “GIS window” is selected, the next two catalog keys (no. 24 and 25 below) do not need to be specified	Applier
24	Use emme network file:	C:\Temp\EMME_NET_Emme2006.211	The network data can be edited by importing Emme data (format: .211). The file should be specified here. It is necessary that the network file exists under the folder indicated, or the system will prompt the user with a message during the execution	Applier
25	Use emme speed table:	C:\EMME\NetworkBase2011\V101_1_02_SPEEDS.DAT	See key no. 23, except the format is .DAT	Applier

26	Do you want to delete the temporary geodatabase ? (Tick=yes)	Tick	This key gives the user the possibility to save hard disk space by deleting the temporary geodatabase (Scenario_Data.mdb). However, by keeping the temporary files, there is no need to run the *Create the editable files* application again (for the current scenario)	Applier

Table 10 Scenario parameters and catalog keys.

The first key (lock the scenario or not) is introduced due to data security reasons. The user can choose to lock the scenario from further editing. A new scenario is always editable, because it is expected that the user will make some changes to the scenario tables. To lock a scenario means that after the run, all the scenario data can be visualized in the interface, but if any edits are made, these edits will not be saved in the main geodatabase.

The base scenario is locked by default, and it should always be locked to enable comparison of the scenarios. In the database, only the relative differences between the base scenario and the scenario alternatives are stored, this is why it is important not to change the base scenario when new scenarios have been introduced. A prompt window gives information whether the scenario is locked or not during the execution of the following applications: *Create the editable files*, *Edit the data (VY)*, *Edit the data (EM)*, *Samgods Model (VY)*, *Samgods Model (EM)*.

The last key (no. 26) gives the user the possibility to reduce the run time during the creation of the temporary files. By deleting the temporary geodatabase, hard disk space could be saved. However, by keeping the files, run time can be saved since the *Create the editable files* application does not have to be run again for the specific scenario. The *Create the editable files* application needs about 5-10 minutes to merge all scenario specific tables with the base scenario.

To avoid inconsistencies between the temporary and the main geodatabase, it is recommended to always control whether the two data sets have the same date and time of last modification, before running the *Samgods Model*. If they differ, there could be edits in the temporary geodatabase that have not been saved to the main geodatabase (by running the *Edit the data* application) and will not be included in the execution of the model. For the *Create the editable files* application, this check is done by the application, in order not to overwrite any not saved edits in the temporary geodatabase by mistake (see Section 3.3).

When “Next” is clicked in the *Edit the data (EM)* application in the applier mode, a second set of catalog keys is displayed, see Table 11. These keys give access from the interface to all the input data for the specific scenario. The model applier does not need to do anything to define the key values. The tables and geodata can be edited by clicking on the “Edit…” button in applier mode. All these files are also accessible from the Data Section window, under Scenario Inputs\Editable data. In Section 2.3 a brief explanation of all files in the Data Section window is given.

Catalog key name	**Example of value**	**Model User's rights**	**Name of file in Data Section window**
ArcMap GIS Project File	C:\Samgods\Scenario_Tree\Base2006\Input_Data.mxd	Applier	Input_Data.mxd
Commodity data [Table]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Cargo_Base2006	Applier	Cargo Table
General parameters of Vehicle Classes [Table]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Vehicles_Parameters_Base2006	Applier	Vehicles Parameters
Table with tax by country (SEK/km) [Table]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Tax_Country_Base2006	Applier	Tax by country Table
Tax by Category (SEK) [Table]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Tax_Category_Base2006	Applier	Tax by Linkclass
Tax by Link (SEK) [Table]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Tax_Link_Base2006	Applier	Tax by link
Toll for bridges (SEK) [Table]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Toll_Link_Base2006	Applier	Toll bridges
Network specific of scenario [Geodata]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Network	Applier	Scenario Network
Port terminals (pilot fees values) [Geodata]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Ports_Swe	Applier	Ports Sweden
Zones and terminals attributes [Geodata]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Nodes	Applier	Nodes
Nodes commodities (interchanges allow)	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Nodes_commodities	Applier	Nodes commodities

[Geodata]			
Frequency data [Geodata]	C:\Samgods\Scenario_Tree\Base2006\Scenario_Data.mdb\Frequency_network	Applier	Frequency network

Table 11 Editable data.

The last two keys are only accessible in developer mode. They define the base scenario and the folder for the Python program, see Table 12 below.

Catalog key name	**Example of value**	**User's rights**
Location of python program	C:\Python27\ArcGIS10.1	Developer
Scenario name for the BASE scenario	Base2006	Developer

Table 12 Developer keys.

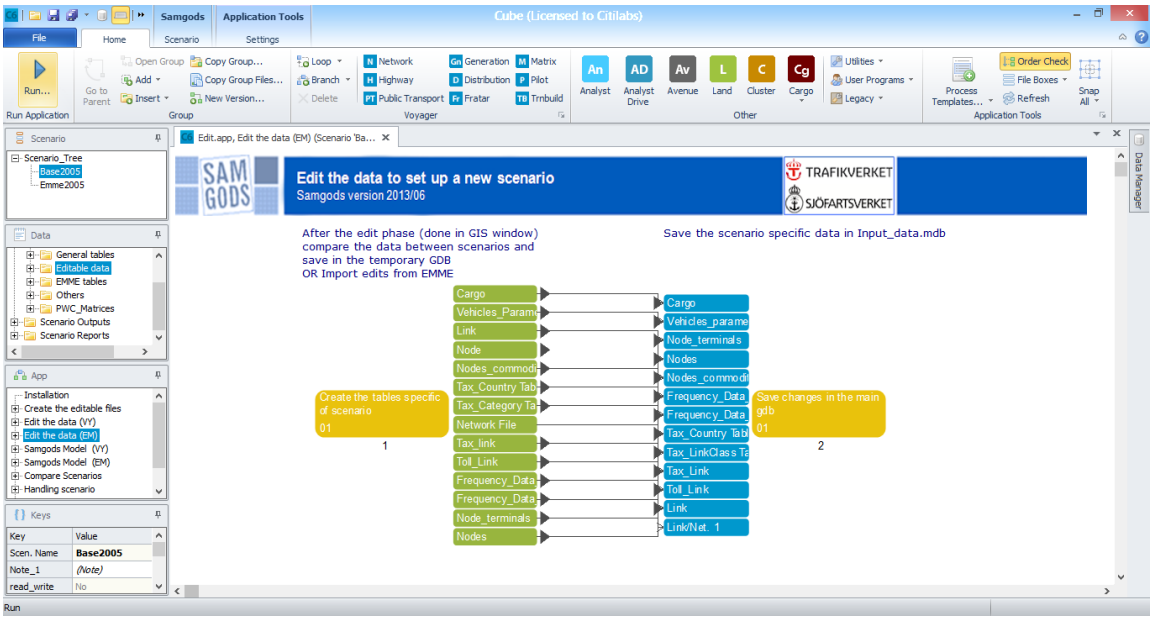


Figure 15 The *Edit the data (EM)* application.

The output of the *Edit the data (EM)* application, a log report containing information on the execution of the application, can be found in the folder Scenario Outputs\Edit the data Report in the Data Section window. This file contains a list of numbered messages giving information on, e.g., whether any data is missing in the input data (e.g. a missing port in the ports_swe table). For a list of messages, see the Chapter 6.

> ***Please Note!*** This application has to be run at least once for every scenario as an Emme user – except the base scenario, if no changes are made.

3.6. Samgods Model (VY) application

This application is for Voyager users. If you are an Emme user, please refer to Section 1.

A schematic picture of the *Samgods Model (VY)* application is outlined in Figure 17. The *Samgods Model (VY)/(EM)* application is the core of the system, since it has the purpose to:

- Run the Samgods model (using Voyager as the supply model)
- Make sure that all required input data exists (in the main geodatabase or created along the process)
- Save all the outputs at the right places (depending on the request of the user)

The application has four main steps:

- LOS calculation – the step where the Level Of Service matrices are calculated. There is one LOS matrix for each vehicle type providing transport time, transport distance, infrastructure fees/charges and the domestic distance for zone-to-zone relations. The LOS matrices are mandatory input to the Samgods model (Please refer to the Method Report and/or the VTI report for further explanation, see Section 8 References)
- Logistics module – the step where the freight flows of the different commodities are assigned to transport chains
- Assignment – the step where the freight flows are assigned to the infrastructure network
- Reports – the step where all standard reports (also called summary reports) from the *Samgods Model (VY)* application are produced

Please refer to the reference material, or the Appendix, for further information of the Samgods model.

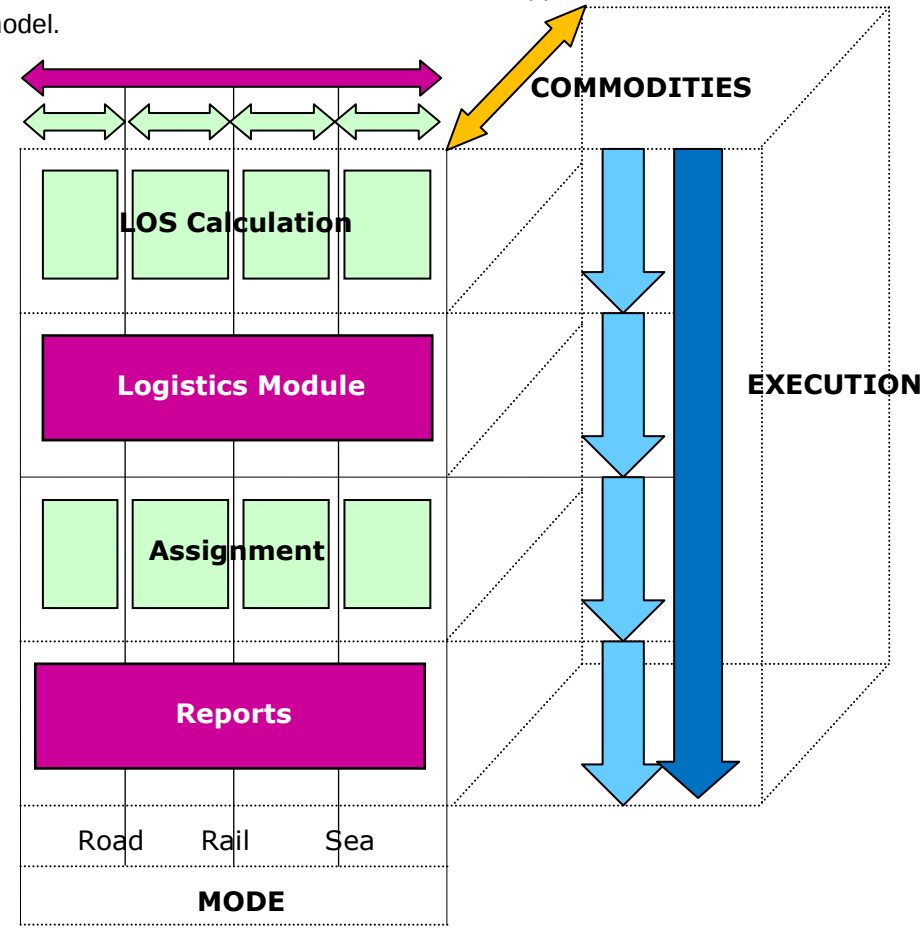


Figure 16 Different ways to run the *Samgods Model (VY)* application.

Description of the applications - *Samgods Model (VY)* application

The *Samgods Model (VY)* application has different choice dimensions, depending on the results that the user wants (see Figure 16). To summarize, all the possibilities are:

- The model could be run as an uninterrupted process or step-by-step (illustrated in the figure by the blue arrows to the right)
- It is possible to run all the commodities at once or one commodity at the time (illustrated by the yellow arrow at the top of the figure)
- For the steps *LOS Calculation* and *Assignment* is it possible to run all the modes or only a specific mode (illustrated by the green boxes to the left in the figure)
- It is possible to select which specific outputs to save from running the Samgods model.

Not all combinations of these choices are allowed. Details are given in the following paragraph. During the run, the user will be informed with a prompt window whether the selections made are coherent with each other.

The option to run the model for one mode at a time is allowed only for the steps highlighted in green, i.e. *LOS Calculation* and *Assignment*. This is due to the fact that the Logistics module needs LOS matrices for all modes. A reason for running only a specific mode could be that the differences in the input data are related only to one mode. For instance, if no other changes have been made in the input data, there is no need to rerun the whole scenario in the *LOS Calculation* step. Regarding the *Assignment* step, the user may be interested in examining the assignment of the freight to the network for only one mode.

The final step, *Reports*, produces summary reports from running the Samgods model. Since this step summarizes the three previous steps, a full run of all four modes needs to be done to obtain complete reports.

It is allowed to run all steps in the *Samgods model (VY)* application for only one specific commodity group (as illustrated by the blue arrows). But when doing this the estimation of flows of empty vehicles gets flawed – please refer to the appendix for more information.

If changes in the input data are detected after the LOS matrices have been created, the program will prompt the user with a message in the report file in the folder Scenario Outputs\Samgods report\Existing Outputs in the Data section window. During the execution, the user is provided with the option to cancel the run (by ticking the answer “Do you want to check data and skip the process?”). See Chapter 6 for further information on the log reports.

The first key for the *Samgods Model (VY)* application is the key to define the base scenario. It is only available in developer mode.

Catalog key name	**Example of value**	**User’s rights**
Scenario name for the BASE scenario	Base2006	Developer

Table 13 Developer key.

The next group of catalog keys, “Run Selections”, refers to the execution order, see Table 14.

	Catalog key name	**Example of value**	**User’s rights**
1	Run only one application, or run all steps	All	Applier
2	Select the mode for the LOS Calculation and the Assignment steps	Road	Applier

3	Select commodities for the Logistics Module (for all commodities, select 0)	0	Applier

Table 14 “Run Selections” keys.

Possible input values for the first key listed in Table 14 are:

- LOS calculation
- Logistics module
- Assignment
- Reports
- All – all fours steps

Output is produced from all steps in the *Samgods model* application. Together with the Microsoft Office tools (such as Access and Excel) this output can be analyzed in-depth in various ways. The purpose of the standard reports produced in the Report step is to give the user a quick overview of the results from running the *Samgods model* application.

Possible input values for the second key listed in Table 14 are:

- All
- Road
- Rail
- Sea
- Air

The last key has a more general function. It is used in all the applications where the output data is filtered by commodity. It is the most important catalog key of these three keys. If the Samgods model first is run for commodity type 1 (for instance), then for all the commodity types (key set to zero), then both the results for commodity type 1 and for all the commodities will be saved. In the scenario folder (under Scenario_Tree, see Table 1), the name of the specific output database is OutputX_{SCENARIO_SHORTNAME}.mdb, where X is the commodity group. Switching from one set of output to another in the interface is easily made by changing the value of this catalog key and clicking “Save”. The possible values for this key are the numbers representing different commodities or zero, representing all commodities. The possible commodities are the NSTR commodity types (1-35) and the STAN commodity types (STAN 1-12). See the Appendix or for instance the Program Documentation (see References) for more information.

The report “Existing Outputs” (in the folder Scenario Outputs\Samgods Report in the Data Section window) is updated during each run and it gives information on the output and the commodity class.

The next set of catalog keys, “Other options”, refers to the optional outputs which can be saved in the scenario folder, see Table 15 below.

	Catalog key name	**Example of value**	**Model User’s rights**
1	Do you want to save the LOS matrices?	Tick	Applier
2	Do you want to save the temporary data into the scenario folder? (emme files for the LOS matrices, network and attribute files)	Yes	Applier
3	Do you want to save the output report files from the Logistics module?	Tick	Applier

4	Do you want to produce buildchainxx.log files?	No	Developer

Table 15 “Other options” keys.

The LOS matrices produced during the cost calculation step are stored in the scenario folder in Voyager format (i.e. in MAT format).

Key no. 2 allows the user to select whether the temporary data should be saved into the scenario folder, e.g., Scenario_Tree/Base2006/LogMod. Examples of how the files are saved are: the LOS matrices as well as the vehicle/empty/tonnes matrices are saved in .314 format and the input files to the Logistics Module are saved in .txt format.

Regarding key no. 3, the output report files from the Samgods model are saved in the scenario folder and also converted into geodatabase tables which are possible to handle via the interface (in Scenario Outputs\Samgods Report\Logistics Module in the Data Section window). The output files that are created (except the standard output that is always produced by the Samgods model) depend on user selections. Please refer to the list of available outputs later in this section to see which output that is affected by this catalog key.

With the fourth key the user selects whether the Buildchain program will produce log files or not. The log files (*.log) contain any warnings that can occur during the execution. Please refer to the Program documentation for the logistics model (see References) for more information.

The next group of keys allows the user to set the advanced options for the logistics module (heading “Logistics module settings – advanced”) and is made up by three catalog keys, see Table 16 below.

	Catalog key name	**Example of value**	**Model User’s rights**
1	Do you want to run the Logistics module on several processors?	Yes	Applier
2	How many processors would you like to run simultaneously?	4	Applier
3	Scaling factor for outputs	Thousands	Applier

Table 16 “Logistics module settings – advanced” keys.

If the computer has more than one CPU available, it is possible to split up the processes between the CPU:s to speed up the run time of the model, using the catalog keys above. The third key enables the user to define the scale of the output that will be presented in the reports. If the value is thousands, the output value (for instance 2.000.000 vehicle kilometres) will be presented as the value divided by thousand (i.e., 2.000 vehicle kilometres in the example).

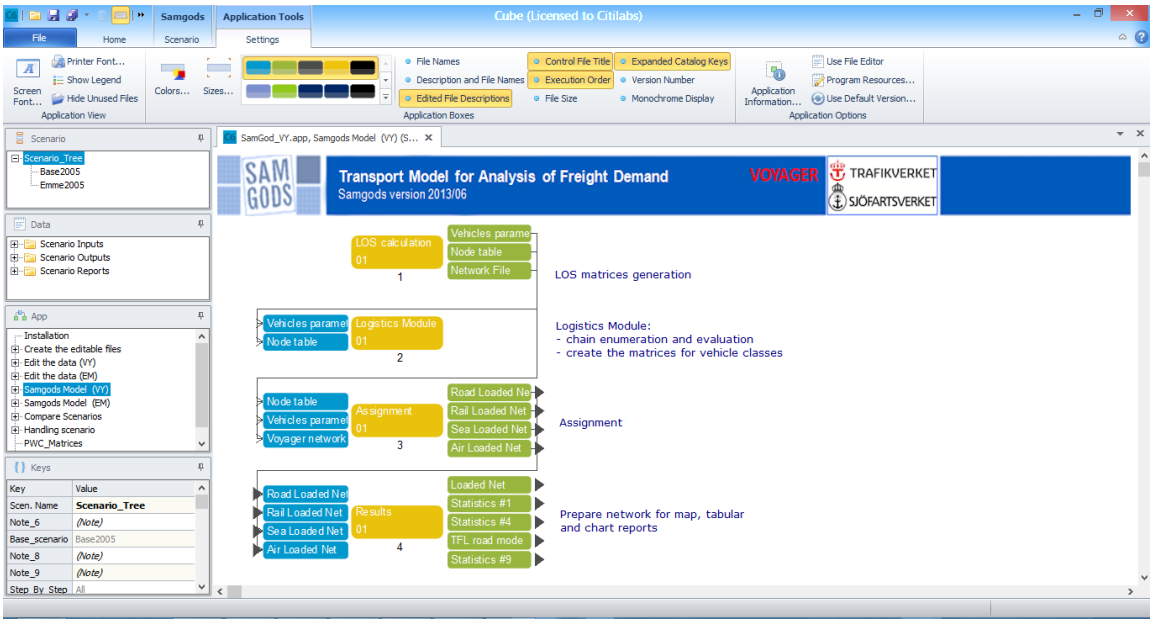


Figure 17 The *Samgods Model (VY)* application.

Based on the selections made by the user, different outputs are created – one set of outputs for each specific setting of the catalog key “Select commodities for the Logistics Module (…)”. The output files and their locations are listed in the file Scenario Outputs\Samgods Report\Existing Outputs in the Data Section window. The available outputs from the respective steps in the *Samgods model* application that can be accessed from the interface are:

LOS Calculation step

- LOS matrices by mode showing distance, time, extra cost, domestic distance and generalized cost summarized link-by-link along the minimum cost path (if the *LOS Calculation* step or the whole run was selected)

Logistics module step

- The loaded vehicle matrices (number of vehicles) by mode and vehicle class (if the *Logistics module* step or the whole run was selected)
- Tonnes flow matrices – tonnes of freight by mode and vehicle class (if the *Logistics module* step or the whole run was selected)
- The empty vehicle matrices (number of empty vehicles) by mode and vehicle class (if the *Logistics module* step or the whole run was selected and the attribute “EMPTY_V” in the Vehicles Parameters table was set to 1 for the specific vehicle type, see Section 5.4). Please refer to the appendix for important information on the empty vehicles calculation
- OD covered – various output reports per vehicle type, chain type, zone, and commodity – all the output used to create summary reports no. 2, 5-8, 10,11 and 12 (see Table 2) (if the *Logistics module* step or the whole run was selected and the catalog key “Do you want to save the output report files from the Logistics Module?” was ticked)

Assignment step

- All freight flows in tonnes, number of loaded vehicles and number of empty vehicles assigned to the network by mode (if the *Assignment* step or the whole run was selected). Please refer to the appendix for important information on the empty vehicles calculation

Report step

- The freight flows in tonnes, number of loaded and empty vehicles assigned to the network with all modes in the same network (if the *Report* step or the whole run was

selected). Please refer to the appendix for important information on the empty vehicles calculation

- Summary report no. 1. Summary table of number of vehicles and vehicle kilometres per vehicle class (domestic and in total) and per mode in the assigned network (if the *Report* step or the whole run was selected). Please refer to the appendix for important information on the empty vehicles calculation
- The trip time length distribution (TFL) for road mode (summary report no. 3) (if the *Report* step or the whole run was selected)
- Summary report no. 4. Summary table of tonnes and tonne kms per vehicle type (domestic, international and total) and per mode (if the *Report* step or the whole run was selected)
- Summary report no. 9. Summary table of vehicle kms, tonne kms, empty vehicle kms, and total vehicle kms per geographic region and mode (road and rail only) (if the *Report* step or the whole run was selected). Please refer to the appendix for important information on the empty vehicles calculation

3.7. Samgods Model (EM) application

This application is for Emme users. If you are a Voyager user, please refer to Section 3.6.

A view of the *Samgods Model (EM)* application can be seen in Figure 19. The *Samgods Model (VY)/(EM)* application is the core of the system, since it has the purpose to

- Run the Samgods model (using Emme as the supply model)
- Make sure that all required input data exists (in the main geodatabase or created along the process)
- Save all the outputs in the right places (depending on the request of the user)

The application has four main steps:

- LOS calculation – the step where the Level Of Service matrices are calculated. There is one LOS matrix for each vehicle type providing transport time, transport distance, infrastructure fees/charges and the domestic distance for zone-to-zone relations. The LOS matrices are mandatory input to the Samgods model
- Logistics module – the step where the freight flows of the different commodities are assigned to transport chains
- Assignment – the step where the freight flows are assigned to the network
- Reports – the step where all standard reports (also called summary reports) from the *Samgods Model (EM)* application are produced

Please refer to the reference material, or the appendix, for further information of the Samgods model.

The application has different choice dimensions, depending on the results wanted by the user. To summarize, all the possibilities are:

- The model could be run as an uninterrupted process or step-by-step (illustrated by the blue arrows to the right in Figure 18)
- It is possible to run all the commodities at once or one commodity at the time (illustrated by the yellow arrow at the top of the figure)
- For the *LOS Calculation* and *Assignment* steps, it is possible to run all the modes or only a specific mode (illustrated by the green boxes to the left in the figure)

- It is possible to select which specific outputs to save from the Samgods model execution

Not all combinations of these choices are allowed. Details are given in the following paragraph. During the run, the user will be informed with a prompt window whether the selections made are coherent with each other.

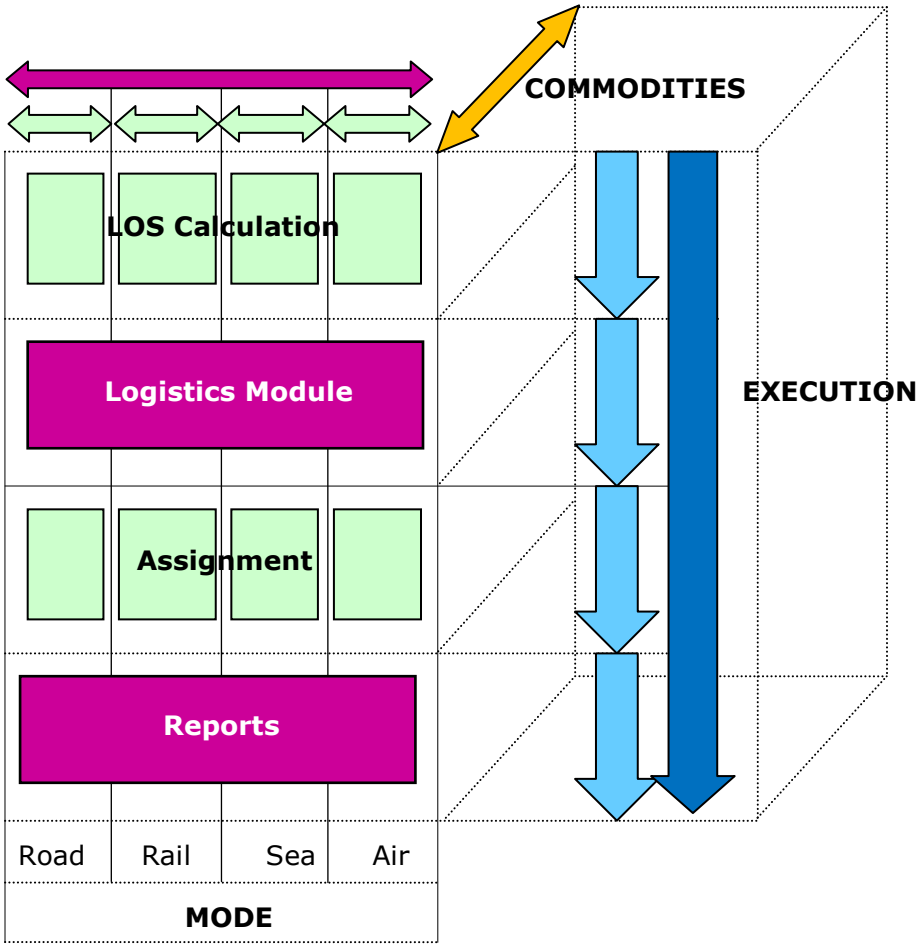


Figure 18 Different ways to run the *Samgods model (EM)* application.

The option to run the model for one mode at a time is allowed only for the steps highlighted in green, i.e. *LOS Calculation* and *Assignment*. This is due to the fact that the Logistics module needs LOS matrices for all modes. A reason for running only a specific mode could be that the differences in the input data are related only to one mode. For instance, if no other changes have been made in the input data, there is no need to rerun the whole scenario in the *LOS Calculation* step. Regarding the *Assignment* step, the user may be interested in examining the assignment of the freight to the network for only one mode.

The final step, *Reports*, produces summary reports from running the Samgods model. Since this step summarizes the three previous steps, a full run of all four modes needs to be done to obtain complete reports.

It is allowed to run all steps in the *Samgods model (EM)* application for only one specific commodity group (as illustrated by the blue arrows). But when doing this the estimation of flows of empty vehicles gets flawed – please refer to the appendix for more information.If changes in the input data are detected after the LOS matrices have been created, the program will prompt the user with a message in the report file in the folder Scenario Outputs\Samgods report\Existing outputs in the Data section window. During the execution, the user is provided with the option to

cancel the run (by ticking the answer “Do you want to check data and skip the process?”). See Chapter 6 for further information on the log reports.

The first keys in the application are only visible in developer mode. They define the base scenario and manage the location of Emme program and databank.

	Catalog key name	**Example of value**	**Model User’s rights**
1	Path for emme– databank	C:\SamGods\01_Programs\EMME	Developer
2	Location of EMME Program	C:\Program Files (x86)\	Developer
3	Scenario name for the BASE Scenario	Base2006	Developer

Table 17 *Samgods Model (EM)* application developer keys.

The first group of catalog keys visible in applier mode, “Run Selections”, refers to the execution order, see Table 18.

	Catalog key name	**Example of value**	**Model User’s rights**
1	Run only one step, or run all steps	All	Applier
2	Select the mode for the LOS Calculation and the Assignment steps	Road	Applier
3	Select commodities for the Logistics Module (for all commodities, select 0)	0	Applier

Table 18 “Run Selections” keys.

Possible choices for key no. 1 listed in Table 18 are:

- LOS calculation
- Logistics module
- Assignment
- Reports
- All – all four steps

Output is produced from all steps in the *Samgods model* application. Together with the Microsoft Office tools (such as Access and Excel) this output can be analyzed in-depth in various ways. The purpose of the standard reports produced in the Report step is to give the user a quick overview of the results from running the *Samgods model* application.

The possible choices for key no. 2 listed in Table 18 are:

- All
- Road
- Rail
- Sea
- Air.

Key no. 3 in Table 18 has a more general function. It is used in all applications where the output data is filtered by commodity. It is the most important catalog key of these three keys. If the Samgods model is first run for, for instance, commodity type 1, and then is run again for all the commodities (key set to zero), then both the results for commodity type 1 and for all the commodities will be saved. In the scenario folder (under Scenario_Tree, see Table 1), the name of the specific output database is OutputX_{SCENARIO_SHORTNAME.mdb}, where X is the commodity group. Switching from one set of outputs to another in the interface is easily made by changing the value of this catalog key and clicking "Save". The possible values for the key are the numbers representing different types of commodities or zero, representing all commodities. The available commodity types are the NSTR commodity types (1-35) and the STAN commodity types (STAN 1-12). See the appendix or for instance the Program Documentation (see References) for more information.

The report "Existing Outputs" (in the folder Scenario Outputs\Samgods Report in the Data section window) is updated during each run and gives information on the outputs and the commodity class.

The next set of catalog keys, "Other Options", refers to the optional outputs that can be saved in the scenario folder, see Table 19.

	Catalog key name	**Example of value**	**Model User's rights**
1	Do you want to save the LOS matrices?	Tick	Applier
2	Do you want to save the temporary data into the scenario folder? (emme files for LOS matrices, network and attribute files)	No	Applier
3	Do you want to save the output report files from the Logistics Module?	Tick	Applier
4	Do you want to produce buildchainxx.log files?	Yes	Developer

Table 19 "Other Options" keys.

The LOS matrices produced during the LOS calculation step are stored in the scenario folder in Emme format (i.e. free format produced with program .314. In each file the structure is origin, :destination value).

Key no. 2 allows the user to select whether the temporary data should be saved into the scenario folder, e.g., Scenario_Tree/Base2006/LogMod. Examples of how the files are saved are: the LOS matrices as well as the vehicle/empty/tonnes matrices are saved in .314 format and the input files to the Logistics Module are saved in .txt format.

Regarding key no. 3 in Table 19, the output report files from the Samgods model are saved in the scenario folder and also converted into a geodatabase table that can be handled in the interface (in Scenario Outputs\Samgods Report\Logistics Module in the Data Section window). The output files that are created (except the standard output that is always produced by the Samgods model) depend on user selections. Please refer to the list of available outputs later in this section to see which output that is affected by this catalog key.

With the fifth key the user selects whether the Buildchain program will produce log files or not. The log files (*.log) contain any warnings that can occur during the execution. Please refer to the Program documentation for the logistics model (see References) for more information.

The last group of keys, called “Logistics model settings - advanced”, is made up by three catalog keys, see Table 20 and Table 21.

Catalog key name	**Example of value**	**Model User’s rights**
Do you want to run the logistic program on several processors?	Yes	Applier
How many processors would you like to run simultaneously?	4	Applier

Table 20 “Logistics module settings – advanced” keys.

If the computer has more than one CPU available, it is possible split up the processes between the CPU's using these two catalog keys and thereby shorten the run time of the model. The last key (shown in Table 21) enables the user to define the scale of the output that will be presented in the reports. E.g., if the value is thousands, the output value (for instance 2.000.000 vehicle kilometres) will be presented as the value divided by thousand (i.e., 2.000 vehicle kilometres in the example).

Catalog key name	**Example of value**	**Model User’s rights**
Scaling factor for outputs	Thousands	Applier

Table 21 Last key.

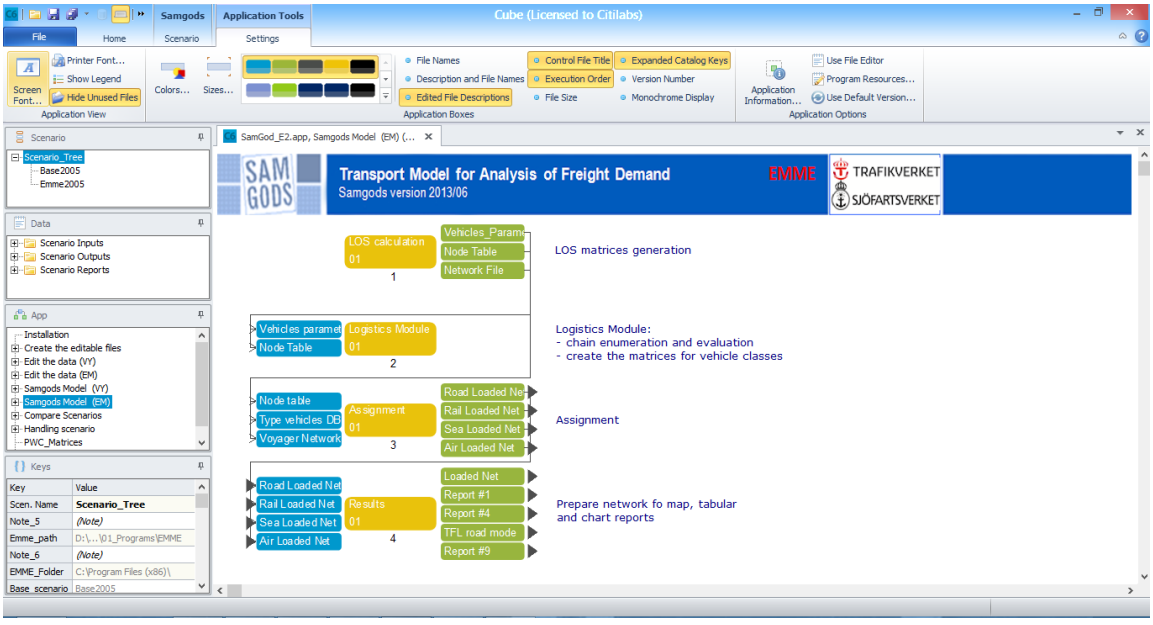


Figure 19 *Samgods Model (EM)* application.

Based on the selections made by the user, different outputs are created – one set of outputs for each specific setting of the catalog key “Select commodities for the Logistics Module (…)”. The output files and their locations are listed in the file Scenario Outputs\Samgods Report\Existing Outputs in the Data Section window. The available outputs from the respective steps in the *Samgods model* application that can be accessed from the interface are:

LOS Calculation step

- LOS matrices by mode showing distance, time, extra cost, domestic distance and generalized cost summarized link-by-link along the minimum cost path (if the *LOS Calculation* step or the whole run was selected)

Logistics module step

- The loaded vehicle matrices (number of vehicles) by mode and vehicle class (if the *Logistics module* step or the whole run was selected)
- Tonnes flow matrices – tonnes of freight by mode and vehicle class (if the *Logistics module* step or the whole run was selected)
- The empty vehicle matrices (number of empty vehicles) by mode and vehicle class (if the *Logistics module* step or the whole run was selected and the attribute "EMPTY_V" in the Vehicles Parameters table was set to 1 for the specific vehicle type, see Section 5.4). Please refer to the appendix for important information on the empty vehicles calculation
- OD covered – various output reports per vehicle type, chain type, zone, and commodity – all the output used to create summary reports no. 2, 5-8, 10,11 and 12 (see Table 2) (if the *Logistics module* step or the whole run was selected and the catalog key "Do you want to save the output report files from the Logistics Module?" was ticked)

Assignment step

- All freight flows in tonnes, number of loaded vehicles and number of empty vehicles assigned to the network by mode (if the *Assignment* step or the whole run was selected). Please refer to the appendix for important information on the empty vehicles calculation

Report step

- The freight flows in tonnes, number of loaded and empty vehicles assigned to the network with all modes in the same network (if the *Report* step or the whole run was selected). Please refer to the appendix for important information on the empty vehicles calculation
- Summary report no. 1. Summary table of number of vehicles and vehicle kilometres per vehicle class (domestic and in total) and per mode in the assigned network (if the *Report* step or the whole run was selected). Please refer to the appendix for important information on the empty vehicles calculation
- The trip time length distribution (TFL) for road mode (summary report no. 3) (if the *Report* step or the whole run was selected)
- Summary report no. 4. Summary table of tonnes and tonne kms per vehicle type (domestic, international and total) and per mode (if the *Report* step or the whole run was selected)
- Summary report no. 9. Summary table of vehicle kms, tonne kms, empty vehicle kms, and total vehicle kms per geographic region and mode (road and rail only) (if the *Report* step or the whole run was selected). Please refer to the appendix for important information on the empty vehicles calculation
- If the user selected to save the Emme scenario, a new folder called EMME is created in the scenario folder with all the relevant data for recreating the scenario (network, speed values, extra attributes values, etc.)

For the EMME user an important note is the following. In the Samgods GUI, the concept applied in all the processes is to always leave the input data only in the main geodatabase and delete all temporary files created along the process. The same concept is applied to the outputs – all the

relevant outputs are saved in the scenario folder and all other temporary files are deleted. The input network (EMME_NET_{Scenario_short_name}.211) and speed flow table (V101_102_LINK_SPEEDS.DAT) are produced and saved during the "Edit the data" application. The Emme outputs are saved under EMME folder using the catalog key described above. If the EMME user would like to save the EMME network into the databank, he/she needs to perform the following manual steps:

1) Open EMME3 interface
2) open tool window
3) Browse to the folder 01_Programs\EMME in the Samgods folder structure (see Table 1)
4) At the question “Your initials” type “XX”
5) Type in “1.22” and press Enter
6) Select point “1= create a scenario”
7) At “Enter scenario number=” type ”2” (the Samgods scenario is always number 1, by default. This has to be created to a new number to not be deleted at the end of the run) and press Enter
8) At “Enter: Title of scenario x”, give the scenario name (the same as the original name)
9) To the question “Is scenario x to become the new current scenario?”, answer yes by typing in “y” and press Enter
10) Type in "2.11" and press Enter
11) Type in the Emme network name and folder
12) Select list device =2
13) Type q to quit the interface

3.8. Compare scenarios application

A view of the application can be seen in Figure 20 on the next page. The purpose of this application is to compare model outputs between different scenarios. Each scenario can be compared with any other scenario present under the Scenario_Tree structure. There are four catalog keys to handle this application, see Table 22.

	Catalog key name	**Example of value**	**Model User’s rights**
1	Select commodities for the Logistics Module (for all commodities, select 0)	0	Applier
2	What do you want to compare?	LOS matrices	Applier
3	Scenario name to use in comparison:	Base2006	Applier
4	Scenario folder for comparison:	C:\Samgods\Scenario_Tree\Base2006	Applier

Table 22 *Compare Scenarios* application catalog keys.

The user needs:

- to select the scenario name that he/she wants to compare with the current scenario using the third catalog key
- to identify the folder location for the scenario used for comparison (e.g. folder where the outputs for scenario selected with previous catalog key are places., usually under Scenario_Tree folder plus short scenario name) and to update accordingly the fourth catalog key value
- to select which commodity type results to compare (select the commodity number, a STAN commodity group or 0 for all in first catalog key) between different scenarios. It is the user's responsibility to verify that the same outputs exist for both scenarios. This could be done by looking in the Existing Outputs file for the respective scenario, found in the folder Scenario Outputs\Samgods Report in the Data section window. If the requested files do not exist for any of the scenarios, the process will be terminated with return code 2 from the Task Monitor program, see Section 2.6
- With the second catalog key the user has the option to compare only a specific set of output (among the ones listed below) or all of the results

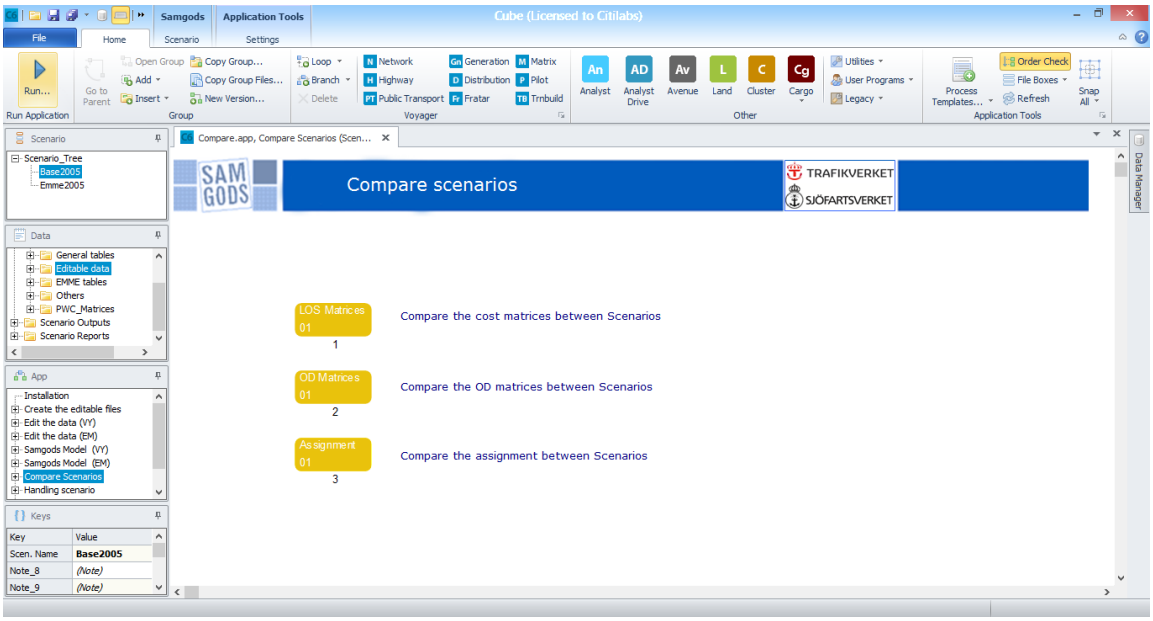


Figure 20 *Compare Scenarios* application.

Three sets of output will be produced by this application:

- The LOS matrix comparison: the absolute differences between the base scenario and the selected scenario for each matrix by mode
- Logistics Module output comparison: The OD vehicle matrices, the OD tonnes matrices, the OD empty vehicle matrices, as well as the margins of the matrices for the vehicle OD matrices (TRIPEND) (the margin is the sum of each row and column, i.e., the totals of attraction and generation): the absolute differences between the base scenario and the selected scenario
- The Assignment comparison: the differences between the assigned network for the base scenario and the selected scenario in absolute values

3.9. Handling scenario application

Figure 21 shows an outline of the *Handling Scenario* application. As described earlier, the scenario data is stored in the main geodatabase as a group of scenario specific tables, so managing this group of files requires dedicated tools to avoid creating any inconsistencies in the input data between scenarios. This application allows the user to delete all no longer required data, to easily import or export scenarios from or to other catalogs, to set up a new structure with a new base scenario, etc.

This application has different subgroups with specific purposes, all of them related to handling the scenario data. The structure can be seen in the applications tree in the Applications window.

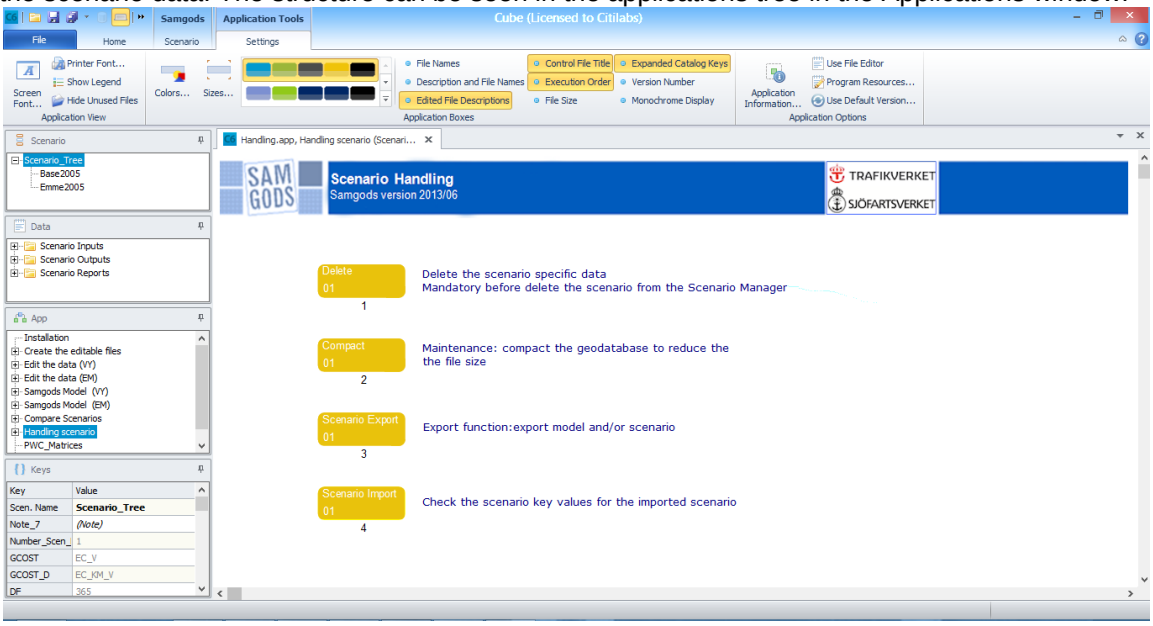


Figure 21 *Handling scenario* application.

Each subgroup corresponds to a specific operation:

- **Delete**: delete the scenario-specific tables completely in the main geodatabase
- **Compact**: compress the geodatabase files to save disk space (see Section 4.9 for further information)
- **Scenario Export**: This subgroup has two main purposes:
    1. One is to enable to set up a new catalog, using the current scenario (i.e., the scenario that the application is executed for) as the base scenario in the new catalog. One case where it may be appropriate to create a new catalog with a new base scenario is if one of the scenarios in a catalog is being used as the base scenario in a new project. Another reason could be that the database becomes too large (with too many alternative scenarios, for instance), since it has a physical limit for its size. Then it may be appropriate to create a new catalog with a base scenario that is a copy of the original, where more alternative scenarios (belonging to the same overall project) may be stored
    2. Another one is to enable to export the scenario-specific tables for a specific scenario into another, already existing catalog with a different base scenario. The exported scenario can never become the base scenario in the destination catalog – if the user wants this, 1. above must be used. This function is useful e.g. when the user wants to set up a scenario in a new catalog with a certain

base scenario, and already has a similar scenario in another catalog with another base scenario. Then the old scenario can be exported to the new catalog and the user only has to change some of the input data, instead of starting all over again

- **Scenario Import**: When the scenario-specific tables have been exported to another catalog using the previous subgroup (Scenario Export), the Scenario Import tool is used to control whether the scenario parameters in the new catalog have the same values as the imported scenario

The first group of catalog keys, see Table 23, is used only by the Scenario Import subgroup no editing is required for these keys otherwise. In key no. 1 the scenario number should be indicated (for Emme users only. The correct value is found in the Report for the import phase, please see Section 4.10 or 4.11 for an explanation). For further explanation of the keys below, please refer to Table 7 or Table 10. In Section 4.10 or 4.11 (depending on for which purpose the application is used), instructions on how to use the catalogue keys are found.

	Catalog key name	**Example of value**	**Model User's rights**
1	Select the scenario no. for the Emme scenario	1	Emme applier
2	Attribute name for extra cost on specific link [SEK]	EC_V	Applier
3	Attribute name for extra cost on specific link [SEK/km]	EC_KM_V	Applier
4	Daily factor for all modes (except for Rail Mode) [days per year]	365	Applier
5	Daily factor for Rail Mode [days per year]	250	Applier
6	Peak Hour Factor	0.12	Applier
7	General parameters for Logistics Module	C:\SamGods\Scenario_Tree\Base2006\Scenario_Data.mdb\LogMod_Base2006	Developer
8	Interest rate used in cost calculations	0.1	Applier
9	Stuffing cost [SEK per tonne]	18	Applier
10	Number of transport chain solutions for the Logistics Module	2	Applier
11	Output variables for the optimal transport solution [e.g.1,2,3, max is 8]	2,3	Applier
12	Initial consolidation factor in BuildChain (1° iteration)	0.75	Applier
13	ALL_LORRY_TYPE_CONSOL	Yes	Applier
14	INDIVIDUAL_OD_LEG_OPTIMIZE	Yes	Applier

15	MINIMUM_ANNUAL_TONNE_DEMAND_4_FREQ_OPTIMIZE	10	Applier
16	Lower bound for consolidation factor	0.1	Applier
17	Upper bound for consolidation factor	0.95	Applier
18	TONNES	DYNAMIC_MAX	Applier
19	Do you want to log parameters from control files?	Yes	Applier
20	Do you want to log reading of input data?	Yes	Applier
21	Do you want to log cost values from vehicle files?	Yes	Applier

Table 23 Catalog keys for the Import subgroup.

The second group of catalog keys is “Installation parameters“, and it is only available in developer mode, see Table 24. It defines the location of the Python program and the name of the base scenario.

Catalog key name	**Example of value**	**Model User’s rights**
Location of Python program	C:\Python27\ArcGIS10.1	Developer
Scenario name for the BASE Scenario	Base2006	Developer

Table 24 Installation parameter keys.

The next key, “Run Selections”, is for defining the commodity type(s), see Table 25. It is only used when the user wants to compress the geodatabase files.

Catalog key name	**Example of value**	**Model User’s rights**
Select commodities for the Logistics Module (for all commodities, select 0)	STAN1	Applier

Table 25 “Run Selections” key.

The fourth group of keys is related to which subgroup the user wants to use, and how to use it, see Table 26.

	Catalog key name	**Example of value**	**User’s rights**
1	Do you want to delete the current scenario? (mandatory if you want to delete the scenario)	Tick	Applier
2	Do you want to compact the geodatabase files?	Tick	Applier
3	Select how you want to use the export function (1) Do you want to export the model into a new folder using the current scenario as base?	3	Applier

	(2) Do you want to export the current scenario into another model? (3) Do nothing		
4	Where do you want to export the model (1) or scenario (2)?	C:\Samgods_V20130701	Applier
5	Name of the base scenario in the new model (1), (2)	Base2006	Applier
6	Do you want to check the imported scenario?	Yes	Applier

Table 26 Catalog keys for selecting actions.

The first catalog key in Table 26 enables the application to delete the scenario specific tables for the current scenario. During the execution, a prompt window will ask the user to confirm the selection made to avoid mistakes.

The second catalog key in Table 26 enables the application to compact all the geodatabase files for the scenario, for both the input and output data. It is recommended to do this regularly, especially after tables etc. have been deleted. Please refer to Section 4.9 for more information.

The third catalog key activates the export function. It has a default value, (3) – “Do nothing”. To export the entire catalog (option (1), catalog = model in the Samgods GUI) (including the current scenario as the new base scenario), a folder location must be provided in the fourth catalog key and a new name should be given to the new base scenario in the fifth catalog key. If the user wants to export only the selected scenario to another catalog (option 2 in the third key), the folder where .cat file for this catalog is located should be indicated in the fourth key. The name of the base scenario in the destination catalog should be specified in key no. 5. If the user wants to delete or compact a scenario (i.e. has selected “(3) Do nothing” for key no. 3), it does not matter what is typed in for keys no. 4 and 5, but since no keys can be left undefined, something must be put there because of the construction of the software (just typing in a random character works).

The last catalog key (no. 6) enables the application to control the scenario parameters for an imported scenario. The scenario parameter values in the new catalog must be identical to the ones in the imported scenario. The execution of this subgroup produces a report, *Report for the import phase*, accessible from the Data Section window in the interface, in the folder Scenario Outputs\Import function report. The report provides a list of the scenario parameters that need to be changed. The parameters are changed by editing the catalogue keys for the imported scenario according to the report, under “Scenario Parameters” in the *Handling Scenario* application and then run the application again.

Regarding output or reports from these functions:

- No outputs are produced by the Delete and Compact subgroups, because they work on the tables inside the geodatabase or on the geodatabase itself
- The Scenario Export function creates a new catalog with a new base scenario, or a new scenario in an existing catalog, depending on the selections made
- The Import Scenario subgroup will create a report, *Report for the import phase*, as described above

3.10. *PWC_Matrices* application

A screenshot of the *PWC_Matrices* application is shown in Figure 22 below. The purpose of the application is to create the PWC matrices in Voyager format in order to enable visualization in the interface.

In applier mode, there are no catalog keys for this application. In developer mode there is a key to identify the base scenario.

Catalog key name	Example of value	Model User's rights
Scenario name for the BASE Scenario	Base2006	Developer

Table 27 Catalog keys for the PWC_Matrices application.

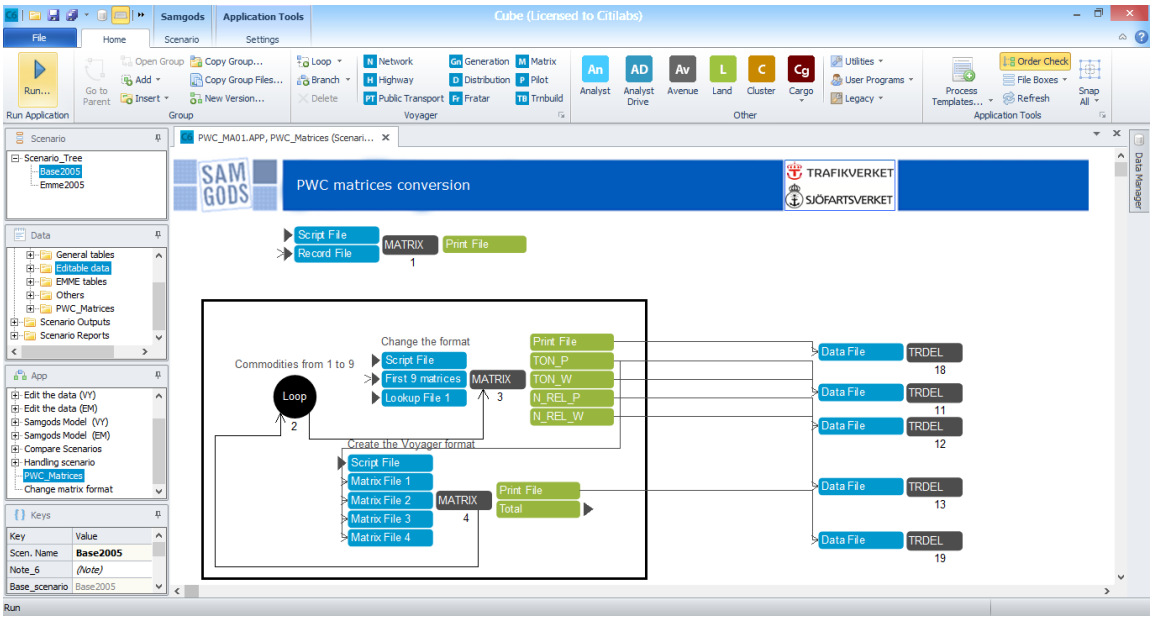


Figure 22 *PWC_Matrices* application.

It is only necessary to run the *PWC_Matrices* once in order to create the matrices. It does not matter for which scenario the application is run since the PWC matrices are the demand input to the model, which is the same for all scenarios. PWC matrices for all commodities will be produced when running the application – 35 matrices in Voyager format are created in the folder 01_Programs\LogMod\Input\PWC\VY_F\, found in the Samgods folder (see Table 1 in Section 1.7). In order to access the matrices from the Data Section window (in Scenario Inputs\PWC_Matrices\PWC matrix for commodity), open the *Samgods Model* application in the Scenario Manager window and select a commodity using the catalog key "Select commodities for the Logistics Module (…)". In this step, the application should not be run, just save the settings by clicking "Save" and the matrices can be found in the Data Section window. The value 0 (for all commodities) is not allowed for this application. This is because the *PWC_Matrices* application only allows showing one commodity at a time.

3.11. Change matrix format application

In Figure 23 below, the *Change matrix format* application is outlined. The purpose of the application is the following. All the data in a catalog is accessible using Microsoft Office Access

(2003 or later) (all data except the geodatabases could also be accessed using Excel or Notepad). The only exception is the data related to the matrix structure, which has a binary Voyager format. The matrix files have a .mat extension. There are two ways to export these files in order to use them in Access, Excel or a text editor. The first way is to use the functions in the Cube Interface. For further details, see the reference guide RG_CubeBase.pdf in Chapter 10 – *Exporting matrix cell values*. In short, this is done by choosing “Export…” from “File” on the menu bar and selecting the appropriate file format.

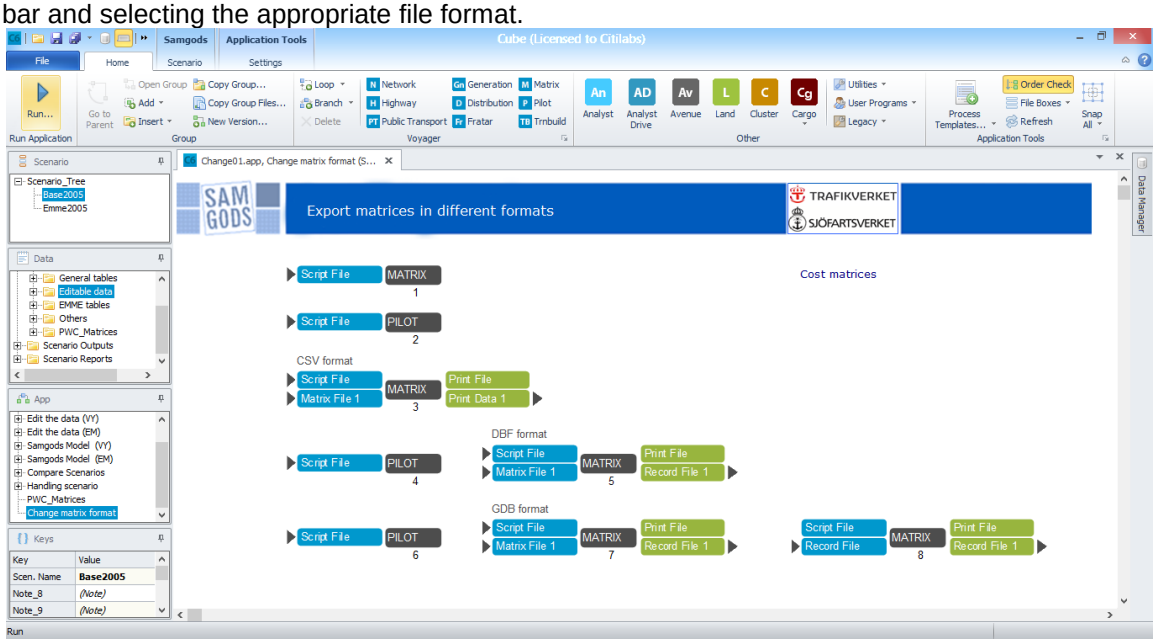


Figure 23 *Change matrix format* application.

The second way is provided by this application, as follows. The catalog keys in Table 28 below handle the export of Voyager format matrix files.

	Catalog key name	**Example of value**	**Model User’s rights**
1	Select commodities for the Logistic Module (for all commodities, select 0)	STAN1	Applier
2	Do you want to export to CSV, DBF or GDB format?	CSV	Applier
3	Do you want to create a new geodatabase or use an existing one?	Existing	Applier
4	Define the GDB where the matrix should be exported.	C:\Samgods\Scenario_Tree\ Base2006\Matrices_Base2006.mdb	Applier
5	What kind of matrix do you want to export?	COST	Applier
6	What vehicle class do you want for the LOS matrices?	317	Applier
7	What is the mode that you want	ROAD	Applier

	for the matrices?		
8	Do you want the distance, time, domestic distance or extra cost LOS matrix?	Time	Applier
9	What type of vehicle class (or total) do you want for the VEHICLES and TONNES matrices?	202	Applier

Table 28 *Change matrix format* application catalog keys.

Regarding key no. 2, CSV format refers to Comma Separated Values, DBF refers to Database Format and GDB refers to Geodatabase format. If the matrix is exported to a geodatabase, it will be created as a table inside an existing geodatabase or a new geodatabase containing this table will be created, depending on the choices made by the user.

To understand the usage of the keys 5-9, and how to export the right values, an explanation on the size and the structure of the matrices is required.

The following table (Table 29) presents how the LOS matrices are saved in the scenario folder, how many matrices that are saved in each matrix file and what their names are. For the OD matrices, see the next table (Table 30).

Folder	Name of matrix file	Name of matrix	Description	Total number of matrices
{Scenario_Dir}	COST_ROAD_{SCENARIO_SHORTNAME}.MAT	D101_{SCENARIO_SHORTNAME}, D102_{SCENARIO_SHORTNAME}, D103_{SCENARIO_SHORTNAME}, D104_{SCENARIO_SHORTNAME}, D105_{SCENARIO_SHORTNAME}	Distance (km) for vehicle type 101-105	25
		T101_{SCENARIO_SHORTNAME}, …, T105_{SCENARIO_SHORTNAME}	Time (hours) for vehicle type 101-105	
		X101_{SCENARIO_SHORTNAME}, …, X105_{SCENARIO_SHORTNAME}	Extra costs for vehicle type 101-105	
		CG101_{SCENARIO_SHORTNAME}, …, CG105_{SCENARIO_SHORTNAME}	Generalized cost for vehicle type 101-105	
		DD101_{SCENARIO_SHORTNAME}, …, DD105_{SCENARIO_SHORTNAME}	Domestic distance (km) for vehicle type 101-105	
{Scenari	COST_RAIL_{SCENARI	D201_{SCENARIO_SHORTNAME}, D202_{SCENARIO_SHORTNAME},	Distance (km) for	40

Description of the applications - *Change matrix format* application

Folder	Name of matrix file	Name of matrix	Description	Total number of matrices
o_Dir}	O_SHORTNAME}.MAT	D204_{SCENARIO_SHORTNAME}, D205_{SCENARIO_SHORTNAME}, D206_{SCENARIO_SHORTNAME}, D207_{SCENARIO_SHORTNAME}, D208_{SCENARIO_SHORTNAME}, D209_{SCENARIO_SHORTNAME}	vehicle type 201, 202, 204-209	
		T201_{SCENARIO_SHORTNAME}, T202_{SCENARIO_SHORTNAME}, T204_{SCENARIO_SHORTNAME}, …, T209_{SCENARIO_SHORTNAME}	Time (hours) for vehicle type 201, 202, 204-209	
		X201_{SCENARIO_SHORTNAME}, X202_{SCENARIO_SHORTNAME}, X204_{SCENARIO_SHORTNAME}, …, X209_{SCENARIO_SHORTNAME}	Extra costs for vehicle type 201, 202, 204-209	
		CG201_{SCENARIO_SHORTNAME}, CG202_{SCENARIO_SHORTNAME}, CG204_{SCENARIO_SHORTNAME}, …, CG209_{SCENARIO_SHORTNAME}	Generalized cost for vehicle type 201, 202, 204-209	
		DD201_{SCENARIO_SHORTNAME}, DD202_{SCENARIO_SHORTNAME}, DD204_{SCENARIO_SHORTNAME}, …, DD209_{SCENARIO_SHORTNAME}	Domestic distance (km) for vehicle type 201, 202, 204-209	
{Scenario_Dir}	COST_SEA_{SCENARIO_SHORTNAME}.MAT	D301_{SCENARIO_SHORTNAME}, D302_{SCENARIO_SHORTNAME}, …, D321_{SCENARIO_SHORTNAME}	Distance (km) for vehicle type 301-321	105
		T301_{SCENARIO_SHORTNAME}, T302_{SCENARIO_SHORTNAME}, …, T321_{SCENARIO_SHORTNAME}	Time (hours) for vehicle type 301-321	
		X301_{SCENARIO_SHORTNAME}, X302_{SCENARIO_SHORTNAME}, …, X321_{SCENARIO_SHORTNAME}	Extra costs for vehicle type 301-321	
		CG301_{SCENARIO_SHORTNAME}, CG302_{SCENARIO_SHORTNAME}, …, CG321_{SCENARIO_SHORTNAME}	Generalized cost for vehicle type 301-321	
		DD301_{SCENARIO_SHORTNAME}, DD302_{SCENARIO_SHORTNAME},	Domestic distance	

Folder	Name of matrix file	Name of matrix	Description	Total number of matrices
		…, DD321_{SCENARIO_SHORTNAME}	(km) for vehicle type 301-321	
{Scenario_Dir}	COST_AIR_{SCENARIO_SHORTNAME}.MAT	D401_{SCENARIO_SHORTNAME}	Distance (km) for vehicle type 401	5
		T401_{SCENARIO_SHORTNAME}	Time (hours) for vehicle type 401	
		X401_{SCENARIO_SHORTNAME}	Extra costs for vehicle type 401	
		CG401_{SCENARIO_SHORTNAME}	Generalized cost for vehicle type 401	
		DD401_{SCENARIO_SHORTNAME}	Domestic distance (km) for vehicle type 401	

Table 29 Matrix table: LOS matrices.

Table 30 presents how the OD Vehicles, Tonnes, and Empty Vehicles matrices are saved in the scenario folder, how many matrices that are saved in each matrix file and their names. The matrices in Table 30 have an index (0 in the table) that represents the commodity class number (e.g., ROAD_VHCLFLOW0_{SCENARIO_SHORTNAME}.MAT). The value 0 refers to all commodities, and a specific number in the range 1 to 35, or STAN1 to STAN12, represents the respective commodity class.

Folder	Name of matrix file	Name of matrix	Description	Total of matrices
{Scenario_Dir}	ROAD_VHCLFLOW0_{SCENARIO_SHORTNAME}.MAT	101_{SCENARIO_SHORTNAME}, … 105_{SCENARIO_SHORTNAME}, Road_{SCENARIO_SHORTNAME}	OD vehicles by vehicle type 101-105 and total for road mode	6

Description of the applications - *Change matrix format* application

Folder	Name of matrix file	Name of matrix	Description	Total of matrices
{Scenario_Dir}	RAIL_VHCLFLOW0_{SCENARIO_SHORTNAME}.MAT	201_{SCENARIO_SHORTNAME}, 202_{SCENARIO_SHORTNAME}, 204_{SCENARIO_SHORTNAME}, … 209_{SCENARIO_SHORTNAME}, Rail_{SCENARIO_SHORTNAME}	OD vehicles by vehicle type 201, 202, 204-209 and total for rail mode	9
{Scenario_Dir}	SEA_VHCLFLOW0_{SCENARIO_SHORTNAME}.MAT	301_{SCENARIO_SHORTNAME}, … 321_{SCENARIO_SHORTNAME}, Sea_{SCENARIO_SHORTNAME}	OD vehicles by vehicle type 301-321 and total for sea mode	22
{Scenario_Dir}	AIR_VHCLFLOW0_{SCENARIO_SHORTNAME}.MAT	AIR_{SCENARIO_SHORTNAME}	OD vehicles by vehicle type 401 and total for air mode	1
{Scenario_Dir}	ROAD_TON0_{SCENARIO_SHORTNAME}.MAT	101_{SCENARIO_SHORTNAME}, … 105_{SCENARIO_SHORTNAME}, Road_{SCENARIO_SHORTNAME}	OD tonnes by vehicle type 101-105 and total for road mode	6
{Scenario_Dir}	RAIL_TON0_{SCENARIO_SHORTNAME}.MAT	201_{SCENARIO_SHORTNAME}, 202_{SCENARIO_SHORTNAME}, 204_{SCENARIO_SHORTNAME}, … 209_{SCENARIO_SHORTNAME}, Rail_{SCENARIO_SHORTNAME}	OD tonnes by vehicle type 201, 202, 204-209 and total for mode rail	10
{Scenario_Dir}	SEA_TON0_{SCENARIO_SHORTNAME}.MAT	301_{SCENARIO_SHORTNAME}, … 321_{SCENARIO_SHORTNAME}, Sea_{SCENARIO_SHORTNAME}	OD tonnes by vehicle type 301-321 and total for sea mode	22
{Scenario_Dir}	AIR_TON0_{SCENARIO_SHORTNAME}.MAT	AIR_{SCENARIO_SHORTNAME}	OD tonnes by vehicle type 401 and total for air mode	1

Folder	Name of matrix file	Name of matrix	Description	Total of matrices
{Scenario_Dir}	ROAD_EMP0_{SCENARIO_SHORTNAME}.MAT	101_{SCENARIO_SHORTNAME}, … 105_{SCENARIO_SHORTNAME}, Road_{SCENARIO_SHORTNAME}	OD vehicles by vehicle type 101-105 and total for road mode	6
{Scenario_Dir}	RAIL_EMP0_{SCENARIO_SHORTNAME}.MAT	201_{SCENARIO_SHORTNAME}, 202_{SCENARIO_SHORTNAME}, 204_{SCENARIO_SHORTNAME}, … 209_{SCENARIO_SHORTNAME}, Rail_{SCENARIO_SHORTNAME}	OD vehicles by vehicle type 201, 202, 204-209 and total for mode rail	10
{Scenario_Dir}	SEA_EMP0_{SCENARIO_SHORTNAME}.MAT	301_{SCENARIO_SHORTNAME}, … 321_{SCENARIO_SHORTNAME}, Sea_{SCENARIO_SHORTNAME}	OD vehicles by vehicle type 301-321 and total for sea mode	22
{Scenario_Dir}	AIR_TON0_{SCENARIO_SHORTNAME}.MAT	AIR_{SCENARIO_SHORTNAME}	OD vehicles by vehicle type 401 and total for air mode	1

Table 30 Matrix table: OD Vehicles, Tonnes and Empty vehicles structure.

Potentially, as many as 2759 matrices with different level of aggregation could exist in the scenario folder. See Table 31 below which values to set in the keys in order to print out a specific matrix.

Catalog key name	**Choices available**	**Description**	**Refer to matrix table**
Select commodities for the Logistics Module (for all commodities, select 0)			
	0	All commodities	
	1-35, STAN 1-12	Single commodity or STAN group	
Do you want to export in CSV, DBF or GDB format?			

	CSV	Comma Separated Values	
	DBF	Database Format	
	GBD	Geodatabase table	
Do you want to create a new geodatabase or use an existing one?			
	Create		
	Existing		
Define the gdb where export matrix:		An existing or new geodatabase, depending on choice for previous key	Table 28
What kind of matrix do you want to export?			
	COST	LOS matrix	Table 29
	VHCLFLOW	OD Vehicles matrix	Table 30
	TON	OD Tonnes matrix	Table 30
	EMP	OD Empty Vehicles matrix	Table 30
Which vehicle class do you want to select for the LOS matrices?		Vehicle type for the LOS matrices	Table 29
	101-105, 201, 202, 204-209, 301-321, 401	Vehicle types	
What is the mode that you want for the matrices?		Mode for the LOS matrices	Table 29
	ROAD, RAIL, SEA, AIR		
Do you want the distance, time, domestic distance or extra cost LOS matrix?		Specification for the LOS matrix	Table 29
	Distance	D101-D105, D201, …	
	Time	T101-T105, T201, …	
	Domestic Distance	DD101-DD105, DD201, …	
	Extra cost	X101-X105, X201, …	
What type of vehicle class (or total) do you want for the VEHICLES and TONNES matrices?		Specification for the OD matrix	Table 30
	101-105, 201, 202, 204-209, 301-321	Select a specific vehicle type	

	Road, Rail, Sea, Air	Select a mode	

Table 31 Choice order.

Based on the choices made in the catalog keys described above, the *Change matrix format* application creates a CSV or DBF file, or a table inside an existing or a new geodatabase, with the structure Origin zone, Destination zone and matrix value. The matrix file is found in the scenario folder and will have a name that gives the specifications made in the catalog keys, e.g.:

{Scenario_DIR}\COST_RAIL_DD202_VOY.CSV

Where the first part (COST) defines the type of matrix (COST, VHCLFLOW, TONNES or EMPTYVEHICLEFLOW), the second part (RAIL) the mode (RAIL, ROAD, SEA or AIR), the third part (DD) the type of matrix for the LOS matrices (DD, D, T or X), the fourth part (202) the vehicle type and the fifth part gives whether the user is an Emme or a Voyager user.

4. General instructions

This chapter gives instructions for how to start using the Samgods GUI. In order to illustrate the usage of the Samgods GUI, it is described how to use the model as a Voyager applier. Most of the procedure is the same in the Emme applier mode. The differences appear mainly in the *Edit the data* application and the *Samgods model* application, which are described in detail for Emme users in Sections **Fel! Hittar inte referenskälla.** and 1. Please note that the procedure is described for applier mode, the available parameter settings differ if developer mode is used.

4.1. Open the model

- Open Cube by clicking on the icon on the desktop
- On the Welcome Screen select “Open an existing catalog”
- Browse to Samgods catalog (file name: Samgods.cat – default folder C:\Samgods)
- Click on “Open”

4.2. Set the model to applier mode

- Right-click on “Samgods.cat” and select Properties, see Figure 24
- In the Catalog Properties window, select the “Model User” tab, see Figure 25
- Select “Model Applier” and the model applier group you want to use (VOYAGER_User is selected for Voyager users and EMME_User for Emme users) and click “OK”. If EMME_User is selected, only the Emme versions of the applications (*Edit the data (EM)* and *Samgods Model (EM)*) are available in the proceeding work with the scenarios, and vice versa for the Voyager user

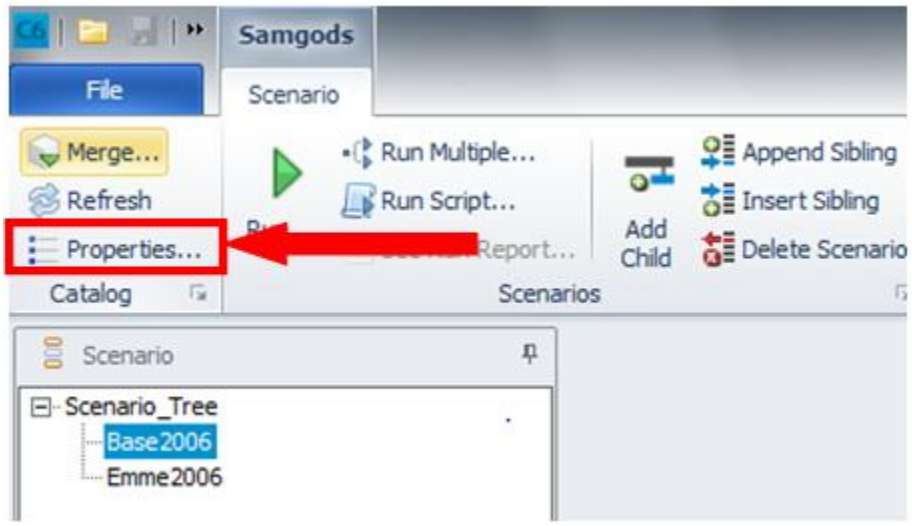


Figure 24 How to access “Catalog Properties”.

Tip: Each time changes have been made to the catalog, such as creating a new scenario, creating new output data by running the model or deleting data, the catalog should be saved. This is done by clicking the save icon (black floppy disk in Figure 25 above). It is recommended to do this often when working with the model.

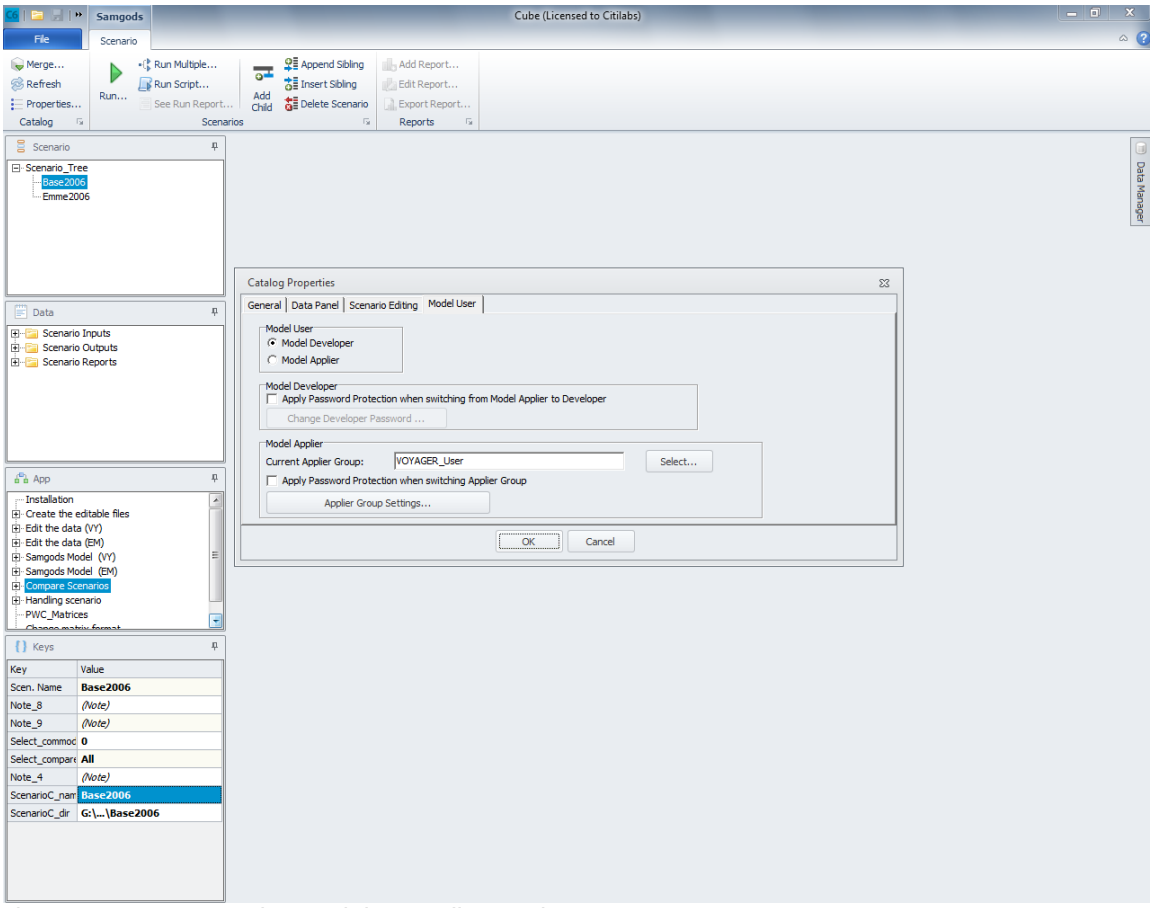


Figure 25 How to set the model to applier mode, Voyager user.

4.3. General guidelines for how to work with the model

After having opened the model and set it to applier mode, the user can start working with the model. Instructions for each specific action can be found in the following chapter. However, it is necessary to also know which actions that should be done and what to look for in the manual. This section gives some guidelines for the order of doing different things.

Working with the model is done by using the different applications and via the Data Section window. In order to use an application for a specific scenario:

- Double-click on the scenario name in the Scenarios window and select the application in the window that opens
- When using the Data Section window, select the scenario you want to work within the Scenarios window by clicking on it and then open the file you want to use from the Data Section window

In order to work with the input data, i.e. to set up a scenario, the input data must be made editable. This is done by:

- Running the *Create the editable files* application, see Section 4.5 for instructions. This must be done also if you just want to view the input data and it is mandatory to run the application at least once for every scenario you want to use in the model
- When the editable data has been created, it could be edited according to the instructions in Chapter 5 (for example). This is done by **using** the *Edit the data* application. Via the application, the editable data can be accessed (see Section 4.5 for instructions). An alternative to use that application to access the editable data is to use the Data Section window

- When all edits to the input data have been made, the edits must be saved before running the actual Samgods model. This is done by **running** the *Edit the data* application (until this point the application has only been used to access the editable data, but it has not been run). For a locked scenario, such as the base scenario, no edits can be saved. However, the application can still be used to view the data

At this point the Samgods model can be executed, by running the *Samgods Model* application (see Section 4.6). By doing that, the output data is produced and can be compared or exported according to the instructions in the following chapters.

Different sets of output could be produced for different runs for the same scenario, for example if the model is run for two different commodity groups. In order to run the same scenario for different commodities, first run the *Create the editable files* application and then *Edit the data* as described above (the *Edit the data* application doesn't have to be run for a locked scenario as e.g. the Base2006 scenario). Then select the commodity group and run the *Samgods Model* application. After this another commodity can be selected and the *Samgods Model* can be run again. The different sets of outputs will be saved separately

In the scenario folder (under Scenario_Tree, see Table 1), the name of the specific output database is OutputX_{SCENARIO_SHORTNAME}.mdb, where X is the commodity group. In the interface, just one set of output for one scenario can be accessible at the time. In order to access a specific set of output, double-click on the specific scenario, select the *Samgods Model* application and select the specific commodity group in the catalog key "Select commodities for the Logistics Module (…)". Click "Save" (not "Run"). In this way the correct set of output is activated and can be accessed from the Data Section window. The scenario selected under scenario window always filter the data shown under data panel. This is a peculiar characteristic of Cube and catalog file. All the logical relations are maintained in a coherent frame. The selection of a particular scenario will specify the values of catalog keys, the folder where results will be saved, the data will be shown under data panel.

Whenever a scenario has been deleted or several runs have been made, the geodatabase files should be compressed in order to save disk space – see Section 4.9 for instructions. When working with the model and making changes to the catalog, such as adding a scenario or making changes to the geodatabase, it is recommended to save the catalog often. This is done by clicking the save button (the black floppy disk icon above the Scenarios window).

4.4. Create a new scenario

To create a new scenario it is necessary to copy the scenario specific tables from another scenario, then merge the scenario specific tables with the base tables and finally visualize them in the graphical interface. To create a new scenario, do the following:

1) In the first step, create the scenario name in the catalog:
    a) In the Scenarios window, right-click on "Scenario_Tree" and select "Add Child"
    b) Type the scenario name (it is not allowed to use blank entries or to start with a number) and press Enter
    c) In the Scenario Properties window, which then is opened, set a scenario code (or use the default one) and click "OK". It is recommended to use a short code that can be associated with the scenario name
    d) The Scenario manager window is opened automatically
2) In the second step, run the *Create the editable files* application as described below:
    a) In the Scenario manager window, select the *Create the editable files* in the Application scroll down menu

b) Define which scenario to copy the scenario specific tables from (e.g., Base2006) by typing the scenario name in the catalog key ”Which scenario do you want to use? (Default is Base2006)”

c) Click “Run”

d) At the end of the run, click “OK”

The temporary geodatabase is now available in the scenario folder (located in the Scenario_Tree folder, see Table 1 in Section 1.7) with all the scenario data. To visualize the tables and the layers of the scenario, change the application from *Create the editable files* to *Edit the data* in the Scenario manager window. In **Fel! Hittar inte referenskälla.** and Figure 27, the default values of the catalog keys are displayed. The first set of catalog keys (**Fel! Hittar inte referenskälla.**) lists the scenario parameters and each catalog key has an editing box (a box where a numerical value or label is expected), a scroll down menu, or a check box. The second set of catalog keys (Figure 27, accessed by clicking “”Next…” twice in the window in **Fel! Hittar inte referenskälla.**) consists of tables and layers of scenario data. By clicking the “Edit...” button on the right, the data is opened in the correct format (i.e., a table in a database window or a layer in a GIS window). Descriptions of the keys and of how to use them for editing and displaying the data are given in Section **Fel! Hittar inte referenskälla.** for Voyager users and **Fel! Hittar inte referenskälla.** for Emme Users.

Tip: To visualize all the layers in a map, click the “Edit...” button, next to the ArcMap GIS Project File catalog, key shown in Figure 27, pointing at the file Input_Data.mxd. All the geographical data will be loaded with a few default legends. The same file is available via Scenario Inputs\Editable Data\ Input_Data.mxd in the Data Section window.

3) Set the catalog keys according to the instructions in Section **Fel! Hittar inte referenskälla.** or **Fel! Hittar inte referenskälla.** and edit the data. For instructions on how to edit the scenario data, see Chapter 5

4) To save the edits that have been made in the temporary geodatabase, the *Edit the data* application must be run. During this phase the scenario specific tables will be created and saved into the main geodatabase. Also, the report file “Report for the edit phase” with information or errors from running the *Edit the data* application will be created in Scenario Outputs\Edit the data Report in the Data Section window

   a) Click “Run”

   b) During the execution, the program will prompt with the question: “Do you really want to save the scenario {SCENARIO_SHORTNAME}?”. If “No” is selected, the temporary geodatabase will be deleted. No changes will then be made to the main geodatabase. If “Yes” is selected, the scenario specific tables will be saved into the main geodatabase. Whether the temporary geodatabase is deleted or not depends on the choice made for the catalog key “Do you want delete the temporary geodatabase?”

   c) At the end of the run, click “OK”

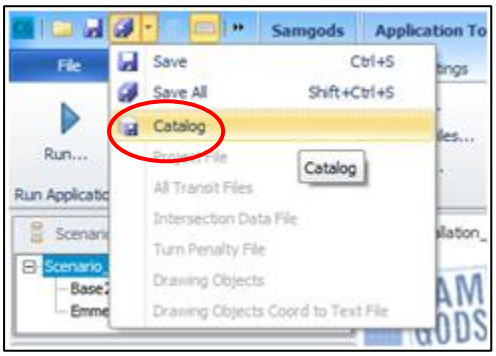
   d) Close the Scenario Manager window. To the question “Do you want to create the scenario {SCENARIO_SHORTNAME}?”, click “Yes”

Tip: Information on errors or results from running the *Edit the data* application is available in Scenario Outputs\Edit the data Report\Report for the edit phase in the Data Section window. For information on this and other log reports, please refer to Chapter 6. It is recommended to consult the reports to make sure no errors have occurred in the input data.

When changes have been made to the catalog, such as adding a new scenario, the catalog file should be saved. This is done by clicking the black floppy disk icon to the left above the catalog in the interface.

4.5. Visualize and/or edit an existing scenario

In terms of the general structure and terminology of the Samgods GUI, an *existing scenario* means that the scenario specific tables are already included in the main geodatabase. To



visualize the data, the scenario-specific tables must be merged with the base scenario tables, and the appropriate layer (or feature class) for the data that is graphically represented in a map needs to be created. A layer can be described as the visual representation of a geographic dataset in any digital map environment. More information on the layers is given in Section 0. We have already introduced how the applications *Create the editable files* and *Edit the data* work together to guarantee consistence and coherence in the input data (see Sections 3.3 and **Fel! Hittar inte referenskälla.**/**Fel! Hittar inte referenskälla.**).

Please note that it is not allowed to rename a scenario, due to the way input and output data are handled in the model.

There are two possible statuses of a scenario (see Section **Fel! Hittar inte referenskälla.** or **Fel! Hittar inte referenskälla.** for further explanation):

- The scenario is still editable (the key “Do you want to lock the scenario from further editing?” in *Edit the data* was set to “No” when *Edit the data* was run and the scenario was saved, see **Fel! Hittar inte referenskälla.** below)
- The scenario is locked, either because it is the base scenario or because the user has locked it (the key “Do you want to lock the scenario from further editing?” was set to “Yes” when the scenario was saved by the *Edit the data* application)

4.5.1.1. Editable Scenario

To visualize and edit an existing scenario, two steps must be performed.

First, the *Create the editable files* application should be run:

1) Double-click on the scenario name in the Scenarios window
2) To the right, the Scenario manager window appears
3) In the Application scroll down menu, select *Create the editable files* (by default this application is selected)
4) Click “Run”
5) Click “OK” at the end of the run

After the run, the temporary geodatabase is available in the scenario folder (located in the Scenario_Tree folder, see Table 1 in Section 1.7) containing all scenario data. To visualize the tables and the layers of the scenario, switch the application from *Create the editable files* to *Edit the data* in the Application scroll down menu in the Scenario manager window. The Scenario manager window will then look as in **Fel! Hittar inte referenskälla.** and Figure 27.The first set of catalog keys lists the scenario parameters and each catalog key has an editing box (a box where a numerical value or label is expected), a scroll down menu, or a check box. The second set of catalog keys (Figure 27, accessed by clicking “Next…” twice in the window in **Fel! Hittar inte referenskälla.**) consists of tables and layers of scenario data. By clicking the “Edit...” button on the right, the data is opened in the correct format (i.e., a table in a database window or a layer in a GIS window). Another way to access the data is to use the Data Section window, where the scenario data can be found in the folder Scenario Inputs\Editable data.

Tip: To visualize all the layers in a map, use the first catalog key (“ArcMap GIS Project File”) shown in Figure 27, pointing at the Input_Data.mxd file. Click the “Edit…” button and all the geographical data will be loaded with only a few default legends. The same file is also available via the Data Section window, in Scenario Inputs\Editable Data\ Input_Data.mxd.

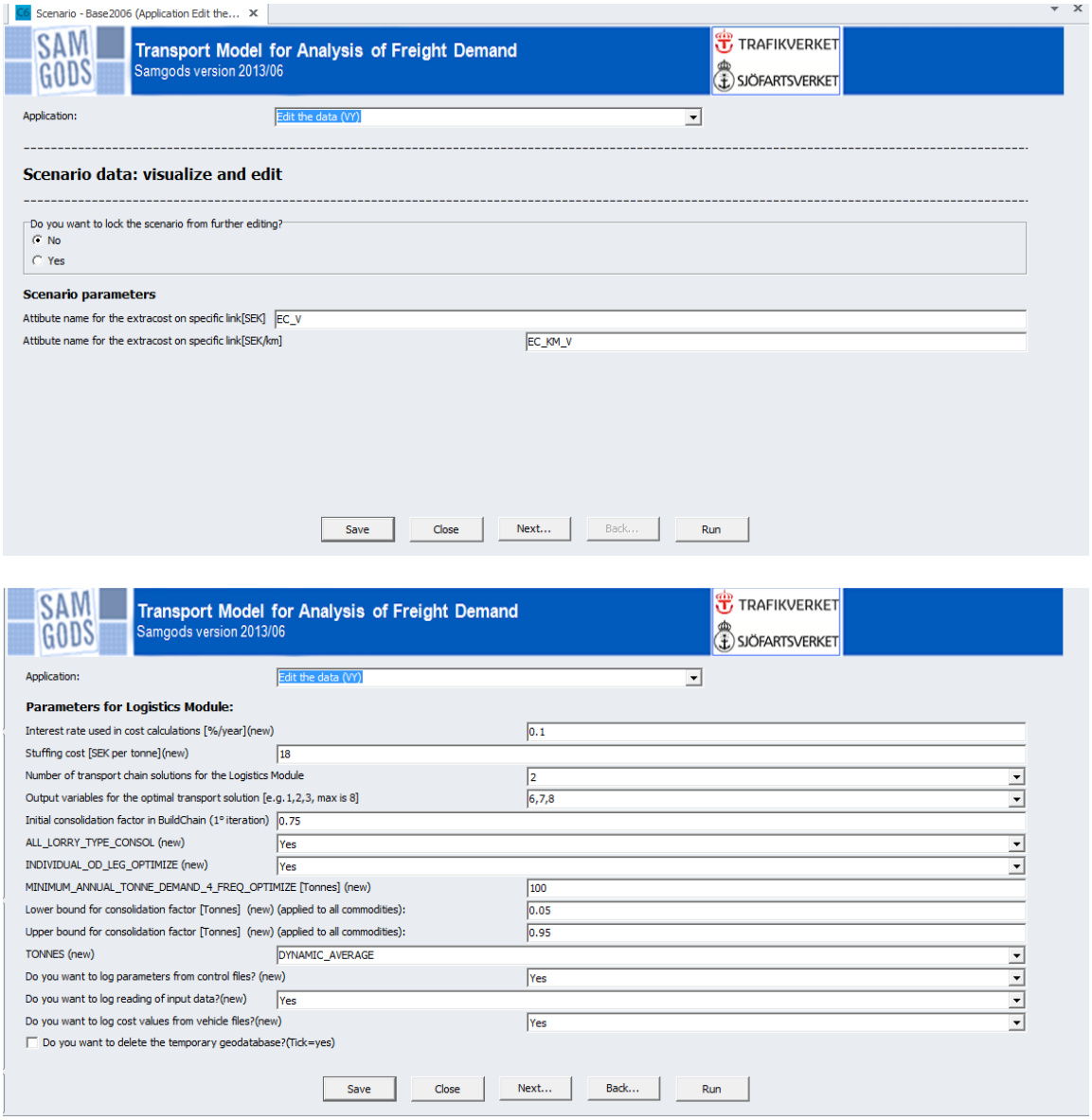


Figure 26 The first set of catalog keys for the Edit the data application.(first and second window)

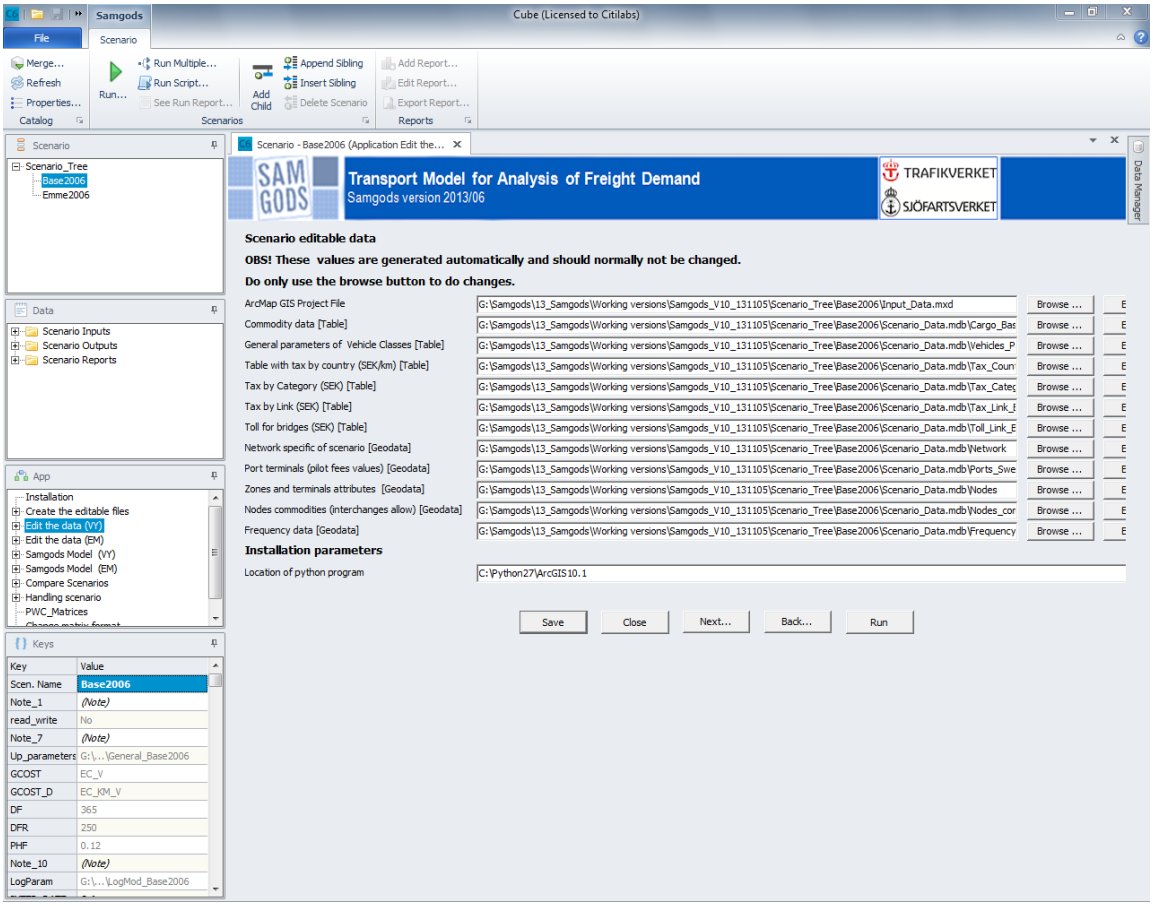


Figure 27 The second set of catalog keys for the Edit the data application.(third window)

The second step to edit an existing scenario is to save the scenario data into the main geodatabase. This is done by running the *Edit the data* application. During this phase, the scenario specific tables are created and saved into the main geodatabase. Also, the report file “Report for the edit phase” is created in the folder Scenario Outputs\Edit the data, which is found in the Data Section window.

1) If the scenario still should be editable, select “No” in the first catalog key (first group of catalog keys, (**Fel! Hittar inte referenskälla.**) (to lock the scenario, select “Yes)
2) Select whether the temporary geodatabase should be deleted or not in the scenario folder
3) Make any edits in the scenario data (see Chapter 5 for instructions)
4) Click “Run”

During the execution, the program will prompt with the question: “Do you really want to save the scenario {SCENARIO_SHORTNAME}?”. If “No” is selected, the temporary geodatabase will be deleted. No edits will then be saved into the main geodatabase. If “Yes” is selected, the scenario specific tables will be saved into the main geodatabase. Whether the temporary geodatabase is deleted or not depends on the choice made for the catalog key “Do you want delete the temporary geodatabase?”.

5) At the end of the run, click “OK” and close the Scenario Manager window

Tip: In the log report in Scenario Outputs\Edit the data Report\Report for the edit phase in the Data Section window, information is given on any errors or on the results of the process during the execution of the *Edit the data* application. For information on this and other log reports, please refer to Chapter 6. It is recommended to consult these reports to make sure no input data errors have occurred.

4.5.1.2. Locked Scenario

For a locked scenario, the first step (i.e., running the *Create the editable files* application and visualizing the data using the *Edit the data* application) is exactly the same as for an editable scenario. It is sufficient to run the *Create the editable files* application once and leave the temporary geodatabase in the scenario folder so that it is accessible each time the user wants to display the input data. It is only necessary to run the *Edit the data* application if the temporary geodatabase should be deleted.

4.6. Run the Samgods model

The different ways to run the Samgods model are described in Sections 3.6 and 1. The following paragraph describes the procedure to run the Samgods model as a Voyager user.

Please note: The Samgods model can also be run in Emme, for which the settings for certain parameters are different than below. However, the main part of the procedure is the same for both types of users. For the details of running the Samgods model in Emme, see the instructions in Section 1.

1) Open the scenario that you want to run by double clicking on it in the Scenarios window. The *Create the editable files* application as well as the *Edit the data* application must be run before running the Samgods model, otherwise the error message ReturnCode=2 will be shown. Please refer to Section 4.5 for an explanation on how this should be done
2) Select the *Samgods Model* application in the Application scroll down menu. Under “Run Selections”, make appropriate selections for the keys below:
    a) “Run only one step, or run all steps” choices: All (full run), LOS Calculation, Logistics Module, Assignment, Reports
    b) “Select the mode for the LOS Calculation and Assignment steps” choices: All, Road, Rail, Sea, Air
    c) “Select commodities for the Logistics Module” choices: 0 for all the commodities or the commodity number for a specific commodity (1-35, or STAN1-STAN12)
3) Under “Other options”, make appropriate selections for the keys below:
    a) “Do you want to save the LOS matrices?” tick if you want to save the LOS matrices
    b) “Do you want to save the temporary data into the scenario folder? (Emme files for LOS matrices, network and attribute files)” tick “Yes” or “No”
    c) “Do you want to save the output report files from the Logistics Module?” tick “Yes” if you want to save the output needed to create the summary reports no. 2, 5, 6, 7, 8, 10 and 11 (i.e., if this key is not ticked, those reports will not be created, neither will the output in the folder Scenario Outputs\Samgods Report\Logistics Module\OD Covered)

   d) (only for developer) For the key “Do you want to produce buildchainxx.log files?”, choose whether to produce the log files from the Buildchain program, containing any warnings from the execution

4) Under “Logistics Module settings – advanced”, make appropriate selections for the keys below:
   a) “Do you want to run the Logistics Module on several processors?”; tick “Yes” or “No”
   b) “How many processors would you like to run simultaneously?”; indicate 1-16 processors
   c) “Scaling factor for outputs”, select “Thousands”, “Millions” or “Billions”
5) Click “Run”
6) A message window appears that informs whether the scenario is locked or still editable – click “OK”
7) At the end of the run, the message window ”Task Run Result” indicates that “VOYAGER Run of Application Samgods Model (VY), 01 is complete” (or a corresponding message for the Emme user). Click “OK”

Tip: The run time for the Samgods model varies depending on the selected options. If a full run with all commodities and modes is selected, it may be appropriate to use multiple processors to reduce the run time. Please refer to Section 3.6 or 1 for more information.

Tip: Each time changes have been made to the catalog, such as creating a new scenario, creating new output data by running the model or deleting data, the catalog should be saved. This is done by clicking the save icon (the black floppy disk above the Scenarios window). It is recommended to do this often when working with the model.

4.7. Compare scenarios

The comparison of outputs from running scenarios is always made between the base scenario (defined during the installation process) and an alternative scenario. The *Samgods Model* application must be run for the specific commodity or commodity group (STAN group or all commodities) for both the base scenario and the scenario selected for comparison before it is possible to compare the outputs. To run the *Compare scenarios* application, do the following:

1) Select the *Compare Scenarios* application in the Applications window
2) In the Scenarios window, open the scenario that you want to compare to the base scenario by double clicking on it
3) Select the commodity class that you want to compare. It is mandatory to select a commodity class (0 for all commodities, a STAN number for a specific STAN group or the commodity number (1-35) for a specific commodity)
4) Select what you want to compare. The alternatives are *LOS matrices*, *Logistics Module*, *Assignment* or all of them
5) Click “Run”. At the end of the run, click “OK”

The results from the comparison between scenarios are saved in their corresponding scenario folders, with the commodity class number indicated in the file name. The .MAT files for the OD matrices from the Logistics Module and LOS matrices will be saved directly in the scenario folder, while the networks from the Assignment step will be saved inside the output geodatabases. All output can be visualized from the Data section window, in Scenario Outputs\Compare (see Table 2).

Please note: It is the user's responsibility to control whether the outputs to compare exist in the scenario folder. Control this in Scenario Outputs\Samgods Report\Existing Outputs in the Data Section window, for the base scenario and for the scenario that is selected for the comparison. If one or more outputs are missing, the run will be terminated with return code 2.

4.8. Delete a scenario

Deleting a scenario requires two steps in different windows.

1) First step: Scenario manager window
    a) Select the scenario that you want to delete in the Scenarios window
    b) Double click on the scenario name. In the Scenario manager window, select the *Handling scenario* application
    c) Under the "Handling scenario" catalog key group, tick the catalog key "Do you want to delete the current scenario?"
    d) Disable all the other catalog keys in the catalog key group "Handling Scenario" ("Do you want to compact the geodatabase files?" – disable, "Select how you want to use the export function" – (3) Do Nothing, "Do you want to control the imported scenario?" – No)
    e) Because of software settings, all catalog keys must be set. However, the key "Where do you want to export the model (1) or scenario (2)?" will not be used in this case. A random character could be typed in
    f) Click "Run"
    g) During the execution, a warning window will prompt: "Do you really want to delete the scenario {SCENARIO_SHORTNAME}?". Selecting "No" means that the scenario will not be deleted. If "Yes" is selected, the scenario will be deleted
    h) At the end of the run, click "OK"
    i) Close the Scenario manager window by clicking "Close"
2) Second step: Scenarios window
    a) Right-click on the scenario name in the Scenarios window and select "Delete"
    b) To the question "Ok to delete the data directories for this scenario and its children?", click "Yes"
    c) Run the *Compact* function, see Section 4.9 below
3) Save the catalog by clicking on the saving icon (black floppy disk, above the Scenarios window)

Please note: If the scenario is in read-only mode (i.e., the scenario is locked), this step will have no effects on the scenario regarding the scenario specific tables. The scenario specific tables will remain in the main geodatabase.

4.9. Compress the geodatabase files

The *Compact* function compresses the files and deletes all the temporary edits stored in the geodatabase. Data that has been deleted previously are permanently deleted when the *Compact* function is run. This reduces the size of the geodatabase and cleans among the files that are stored in the geodatabase by only keeping the necessary data. Running the *Compact* function is required every time that a scenario is deleted or when several runs have been made, and it will influence:

- The main geodatabase containing all the **input** data (i.e., Input_data.mdb)
- The geodatabase containing all the **outputs** of a specific scenario in the scenario folder (i.e. OutputX_{SCENARIO_SHORTNAME}.mdb, where X is the commodity group – 0, 1-35 or a STAN group)

The choice to compact a specific **output** geodatabase is only related to the selected scenario. However, when the *Compact* function is employed, the **input** data (main geodatabase, Input_data.mdb) will also be compacted. Run the *Compact* function in the following way:

1) In the Scenarios window, double click on the scenario that you want to compact
2) In the Scenario manager window, select the *Handling scenario* application
3) Under “Run Selections” (catalog key “Select commodities for the Logistics Module (…)”), set the commodity or commodity group corresponding to the set of output that you want to compact
4) Under the “Handling scenario” catalog key group, tick the catalog key “Do you want to compact the geodatabase files?”
5) Disable all the other catalog keys in the “Handling scenario” catalog key group (Do you want to delete the current scenario? – disable, “Select how you want to use the export function” – (3) Do Nothing, “Do you want to check the imported scenario?” – No)
6) Because of software settings, all catalog keys must be set. However, the key “Where do you want to export the model (1) or scenario (2)?” will not be used in this case. A random character could be typed in
7) Click “Run”
8) At the end of the run, click “OK”

Tip: Run the *Compact* function every time a scenario is deleted or several runs have been made, to reduce the amount of data stored in the geodatabase.

4.10. Export and import a catalog

The Scenario Export function can be used to export a catalog into a new catalog, including a scenario that will be the base scenario in the new catalog. It can also be used to export a single scenario into an existing catalog – see the next chapter.

To export the entire catalog into a new catalog directory and create a new base scenario, the following is required:

1) In the Scenarios window, double click on the scenario that you want to use as the base scenario in the new catalog
2) In the Scenario manager window, select the *Handling scenario* application
3) For the catalog key “Select how you want to use the export function?”, select “(1) Do you want to export the model into a new folder using the current scenario as base?”
4) Disable the other catalog keys in the “Handling scenario” catalog key group (“Do you want to delete the current scenario?” – disable, “Do you want to compact the geodatabase files?” – disable, “Do you want to control the imported scenario?” – No)
5) To set the value for the catalog key “Where do you want to export the model (1) or scenario (2)?”, type in the destination folder in the editing box
6) To set the value for the catalog key “Name of the base scenario in the new model (1), (2)”, type in the new name you want to use for the current scenario, when it has been exported as the base scenario in the new catalog, in the editing box
7) Click “Run”
8) At the end of the run, click “OK”

Please note: A new folder has to be defined for the Scenario export function. If the destination catalog already exists, the user will be informed by a prompt saying “The model already exists” “This might be an error. The process will be terminated. Check the folder”. In the Samgods GUI, it is never possible to overwrite an existing catalog.

To complete the export of a catalog properly by controlling that the scenario parameters in the new catalog correspond to the imported ones, the *Scenario Import* function must be run. The required actions are:

1) Close the old catalog by clicking on the x
2) Open the new catalog created during the export
3) Update the paths for the applications as described in Section 1.7 and run the *Installation* application (type in the new base scenario name according to the name specified in the *Scenario Export* function in the corresponding catalog key please refer to Section 1.7 for further instructions)
4) The Scenario_Tree in the Scenarios window in the new catalog only contains one scenario, which has the name “Rename”. It should be renamed to the name that was specified when running the *Scenario Export* function. This is done by right-clicking on the scenario name and selecting “Rename”. The code should also be updated, which is done by right-clicking and selecting “Properties”. Define a short code that is similar to the scenario name
5) In the Applications window, select *Handling scenario* and then double click on the new scenario in the Scenarios window. Tick the catalog key “Do you want to check the imported scenario?” under the *“Handling scenario*” catalog key group

6) Disable all other catalog keys in the “Handling scenario” catalog key group (“Do you want to delete the current scenario?” – disable, “Do you want to compact the geodatabase files?” – disable, “Select how you want to use the export function” – (3) Do nothing)
7) Because of software settings, all catalog keys must be set. However, the key “Where do you want to export the model (1) or scenario (2)?” will not be used in this case. A random character could be typed in
8) Click “Run”
9) At the end of the run, click “OK”
10) Check the report in Scenario Outputs\Scenario_Import_function_Report\Report for the Import Phase in the Data Section window
11) If any scenario parameters need to be changed according to the report, change those catalog key values for the imported scenario, under “Scenario Parameters” in the *Handling scenario* application and run the application again. Check the report again and repeat if necessary

Tip: Each time changes have been made to the catalog, such as creating a new scenario, creating new output data by running the model or deleting data, the catalog should be saved. This is done by clicking the save icon (the black floppy disk above the Scenarios window). It is recommended to do this often when working with the model.

4.11. Export and import a scenario

To export a scenario into an existing catalog already containing a base scenario, the following actions are required:

1) In the Scenarios window, double click on the scenario that you want to export. In the Applications scroll down menu in the Scenario manager window, select the *Handling scenario* application
2) For the catalog key “Select how you want to use the export function?”, select “(2) Do you want to export the current scenario into another model?”
3) Disable the other catalog keys in the “Handling scenario” catalog key group (“Do you want to delete the current scenario?” – disable, “Do you want to compact the geodatabase files?” – disable, “Do you want control the imported scenario?” – No)
4) To set the value for the catalog key “Where do you want to export the model (1) or scenario (2)?”, type in the path of the folder where the .cat file for the new catalog is located, in the editing box
5) In the field for the catalog key “Name of the base scenario in the new model (1), (2)”, type in the name of the base scenario in the destination catalog
6) Click “Run”
7) At the end of the run, click “OK”

Please note: The exported scenario will have the same scenario name in the new catalog as in the catalog that it was exported from.

To complete the export of a scenario properly by controlling that the imported catalog key values correspond to the ones in the new catalog, the *Scenario Import* function must be run. The required actions are:

1) Close the catalog from where the scenario was exported (i.e., the one that is open) by clicking on the x
2) Open the catalog to where the scenario has been exported
3) Create a new scenario, with the same name as set in the export phase, in the catalog (right-click on Scenario_Tree in the Scenarios window and select “Add child”, type in the name and press Enter. Define the scenario code and click “OK”)
4) In the Scenario Manager window, select the *Handling scenario* application in the Scenario manager window. Tick the catalog key “Do you want to control the imported scenario?” under the “Handling scenario” catalog key group
5) Disable all other catalog keys in the “Handling scenario” catalog key group (“Do you want to delete the current scenario?” – disable, “Do you want to compact the geodatabase files?” – disable, “Select how you want to use the export function” – (3) Do nothing)
6) Because of software settings, all catalog keys must be set. However, the key “Where do you want to export the model (1) or scenario (2)?” will not be used in this case. A random character could be typed in
7) Click “Run”
8) At the end of the run, click “OK”
9) Control the report Scenario Outputs\Scenario_Import_function_Report\Report for the Import Phase in the Data Section window to see if any edits are necessary
10) Change any catalog key values listed in the report for the imported scenario, under “Scenario Parameters” in the *Handling scenario* application and run the application again, Check the report again and repeat if necessary

Tip: Each time changes have been made to the catalog, such as creating a new scenario, creating new output data by running the model or deleting data, the catalog should be saved. This is done by clicking the save icon (the black floppy disk above the Scenarios window). It is recommended to do this often when working with the model.

4.12. Produce PWC Matrices in Voyager format

To produce the PWC matrices in Voyager format, do the following:

1) Double click on a scenario (it does not matter which scenario) in the Scenarios window and select the *PWC_Matrices* application in the Scenario manager window
2) Click ”Run”
3) At the end of the run, click “OK”

The matrices are now available in the folder 01_Programs\LogMod\Input\PWC\VY_F\, found in the Samgods folder (see Table 1 in Section 1.7). In order to display the matrices for a commodity via the Data Section window, do the following:

1) Double click on a scenario (it does not matter which scenario) in the Scenarios window and select the *Samgods Model* application in the Scenario manager window
2) Select a commodity using the catalog key “Select commodities for the Logistics Module (…)”. Only the numbers 1-35 are allowed here (not 0 for all commodities or any STAN group)
3) Click “Save” to save the settings

4) The matrices for the selected commodity are now available in the Data Section window, in Scenario Inputs\PWC_Matrices\PWC matrix for commodity

4.13. Change matrix format

To export a matrix in CSV or DBF format, or as a table in a geodatabase (GDB format):

1) In the Scenarios window, double click on the scenario corresponding to the matrix you want to export
2) In the Scenario manager window, select the *Change matrix format* application and make appropriate selections for the desired matrix (see the details in Section 0)
3) Click “Run”
4) At the end of the run, click “OK”

The output is found in the scenario folder with a CSV or DBF extension or as a table inside a geodatabase, depending on the selections made.

4.14. Visualize the outputs

In the Data Section window, the results that are produced in all steps are available. Please refer to Section 2.3 for details.

4.15. General information on the GIS Window

The ArcMap GIS Project file (Input_data.mxd) is opened from the Data Section window by opening the folder Scenario Inputs\Editable data and double-clicking on the .mxd file. The .mxd file can also be visualized from the *Edit the data* application, by opening the scenario, clicking the “Next…” button to reach the second set of catalog keys and finally clicking the “Edit…” button for the ArcMap GIS Project File key. The map document (.mxd) contains the following information:

1) Details of all input data that can be visualized in a map (data with [Geodata] label) with the following layers (where the default values are indicated in parenthesis):
    a) Frequency_network (disabled) (i.e., frequencies of services between terminals, for more information on this network, see the appendix)
    b) Nodes_commodities (disabled) (i.e., which commodities which can be handled at the terminals)
    c) Nodes (disabled)
    d) Ports_swe (disabled)
    e) Network – Link and Node layer (active)
    f) Samgods_zones (active)

A set of default legends (see

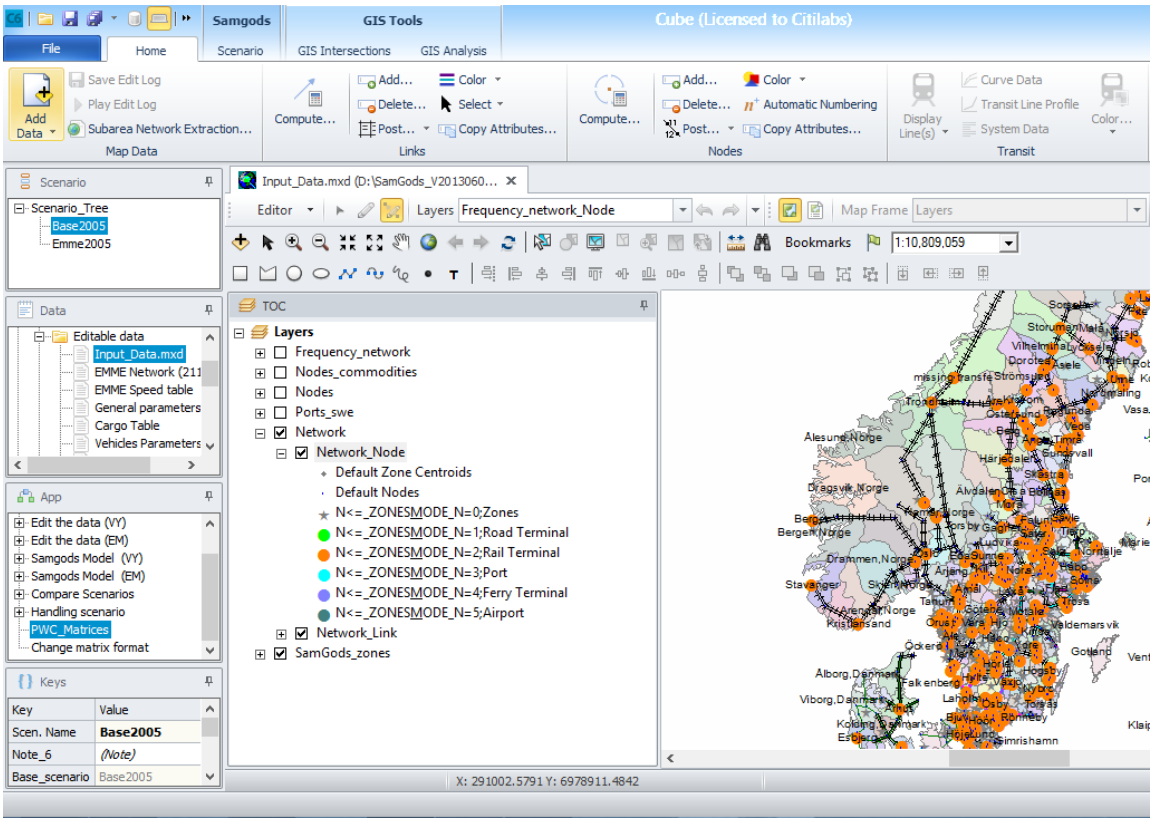


Figure 28 below for an example) for the node and the link attributes for the layers:

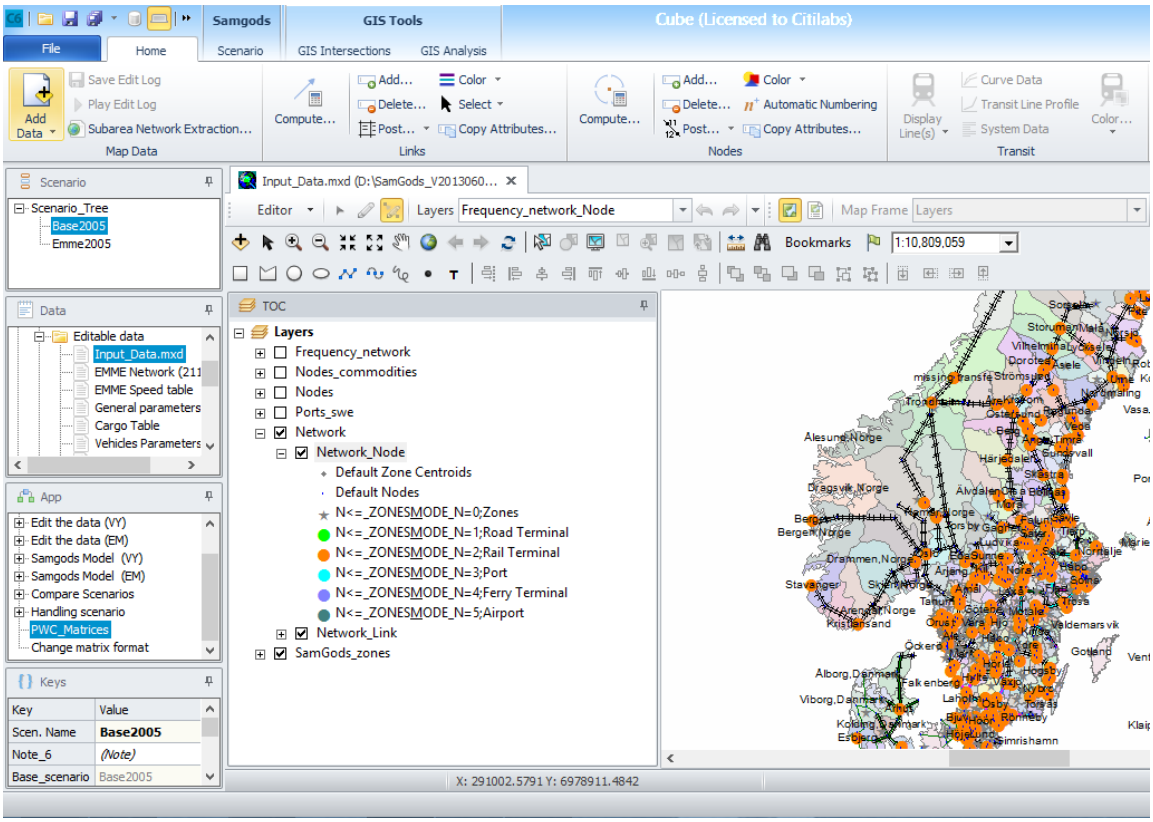
a) Nodes_commodities: Type of terminal

b) Nodes: Type of terminal

c) Ports_swe: Swedish Ports

d) Network:

Network_Node: Terminal type (shown in



a. Figure 28)
   i. Node type – Road
   ii. Node type – Rail
   iii. Node type – Sea
   iv. Node type – Ferry
   v. Node type – Air
b. Network_Link: Modes

e) Samgods zones

It is possible to enable or disable and edit these legends by selecting the specific layer in the TOC (Table Of Contents – see Figure 29) and clicking on the icons

(the first ones for editing and enable/disable the node layer legends and the second ones for the link layer legends), see

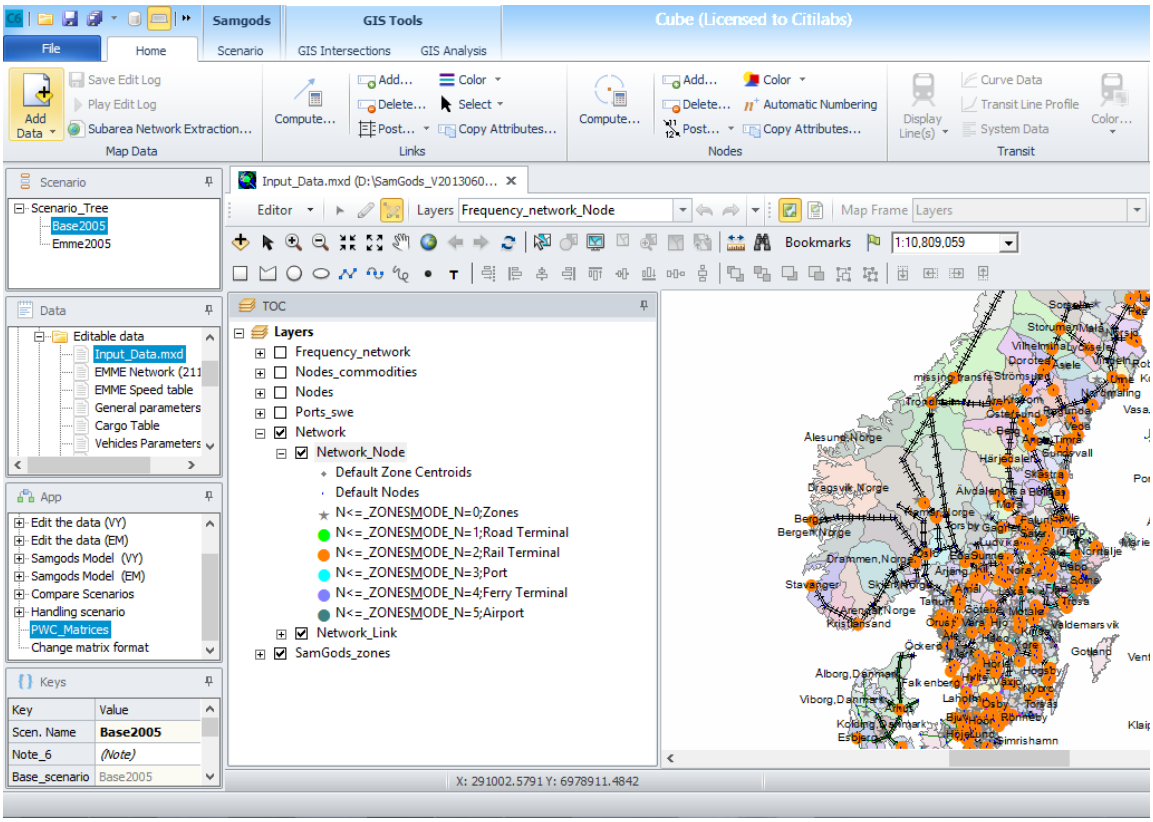
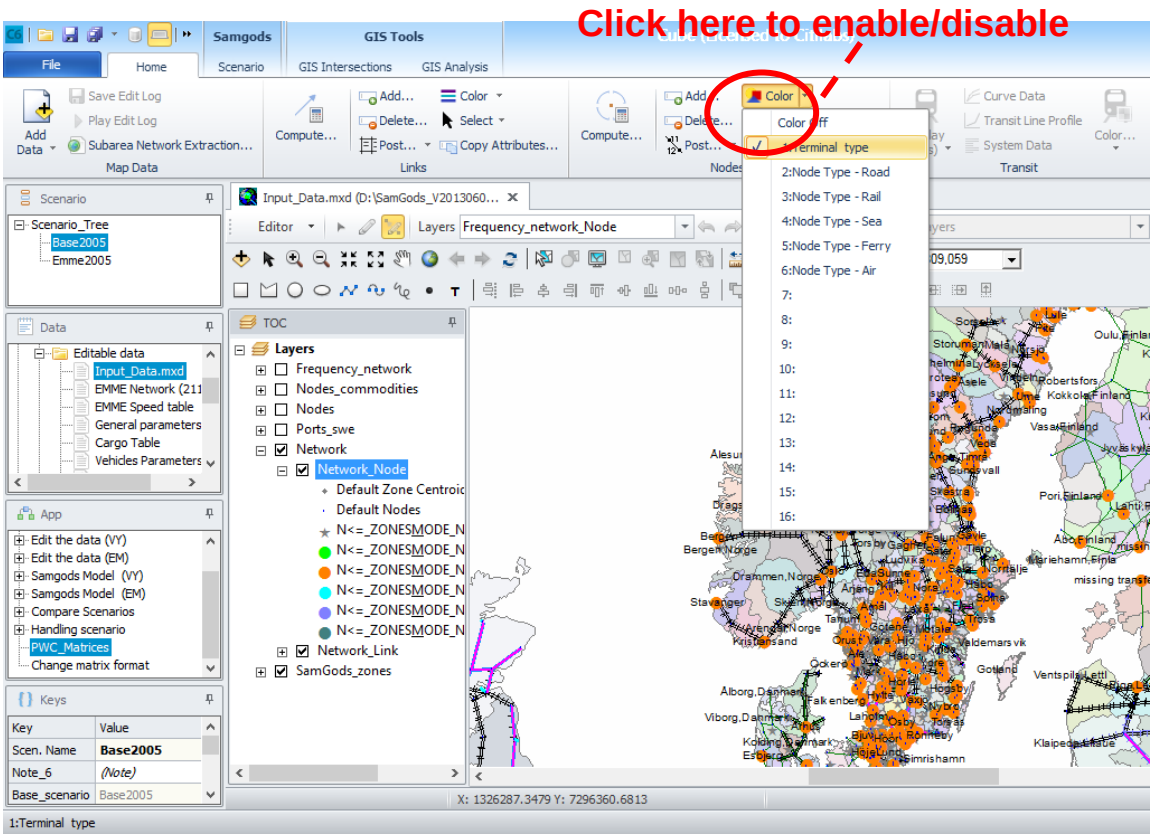

Samgods
GIS Tools
Cube (Licensed to Citilabs)
File
Home
Scenario
GIS Intersections
GIS Analysis
Add Data
Save Edit Log
Play Edit Log
Subarea Network Extraction...
Map Data
Compute...
Add...
Delete...
Post...
Color
Select
Copy Attributes...
Links
Automatic Numbering
Nodes
Curve Data
Transit Line Profile
System Data
Transit
Scenario
Scenario_Tree
Base2005
Emme2005
Data
Editable data
Input_Data.mxd
EMME Network (211
EMME Speed table
General parameters
Cargo Table
Vehicles Parameters
App
Edit the data (VY)
Edit the data (EM)
Samgods Model (VY)
Samgods Model (EM)
Compare Scenarios
Handling scenario
PWC_Matrices
Change matrix format
Keys
Key
Value
Scen. Name
Base2005
Note_6
(Note)
Base_scenario
Base2005
Input_Data.mxd (D:\SamGods_V2013060...
Editor
Layers
Frequency_network_Node
Map Frame
Bookmarks
1:10,809,059
TOC
Layers
Frequency_network
Nodes_commodities
Nodes
Ports_swe
Network
Network_Node
Default Zone Centroids
Default Nodes
N<=_ZONESMODE_N=0;Zones
N<=_ZONESMODE_N=1;Road Terminal
N<=_ZONESMODE_N=2;Rail Terminal
N<=_ZONESMODE_N=3;Port
N<=_ZONESMODE_N=4;Ferry Terminal
N<=_ZONESMODE_N=5;Airport
Network_Link
SamGods_zones
X: 291002.5791 Y: 6978911.4842

Figure 28 .


Click here to enable/disable
Color
Color Off
1:Terminal type
2:Node Type - Road
3:Node Type - Rail
4:Node Type - Sea
5:Node Type - Ferry
6:Node Type - Air
7:
8:
9:
10:
11:
12:
13:
14:
15:
16:
X: 1326287.3479 Y: 7296360.6813
1:Terminal type

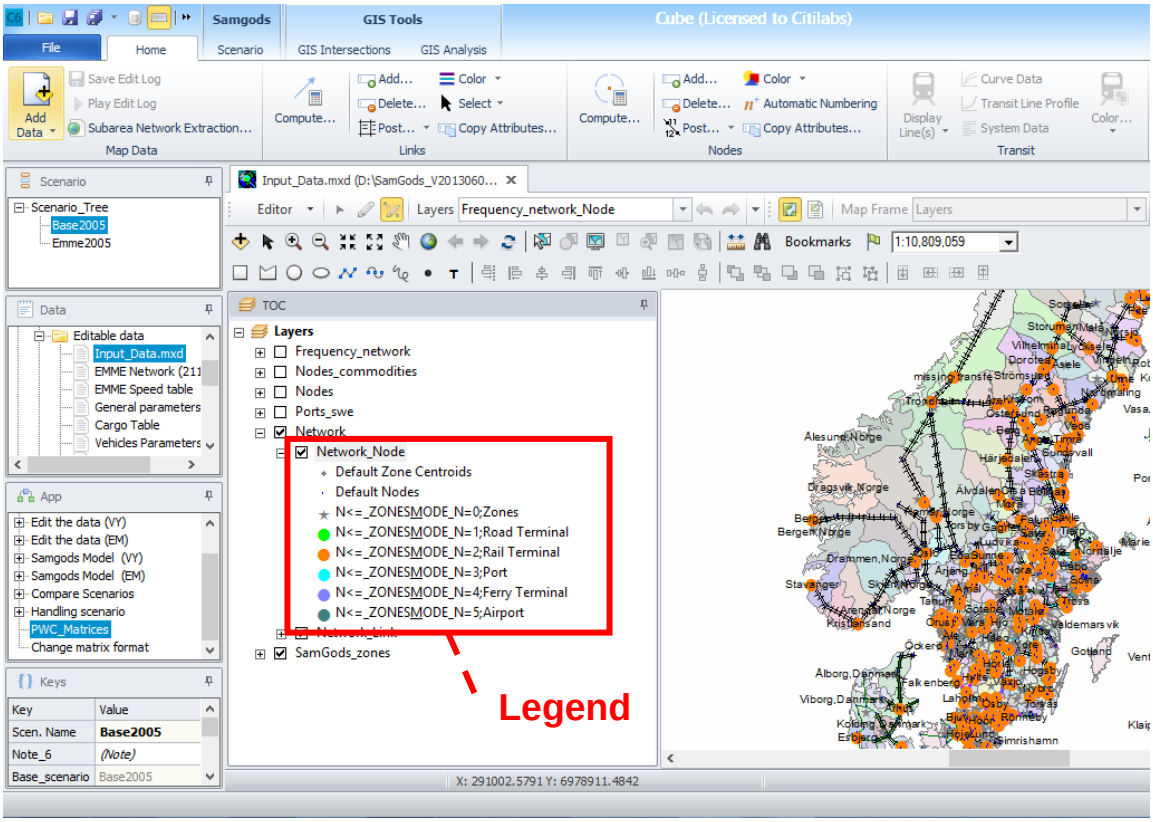


Figure 28 Enable the layer and select the set of legends as in the figure. Example of default legends, for the Network_Node layer.

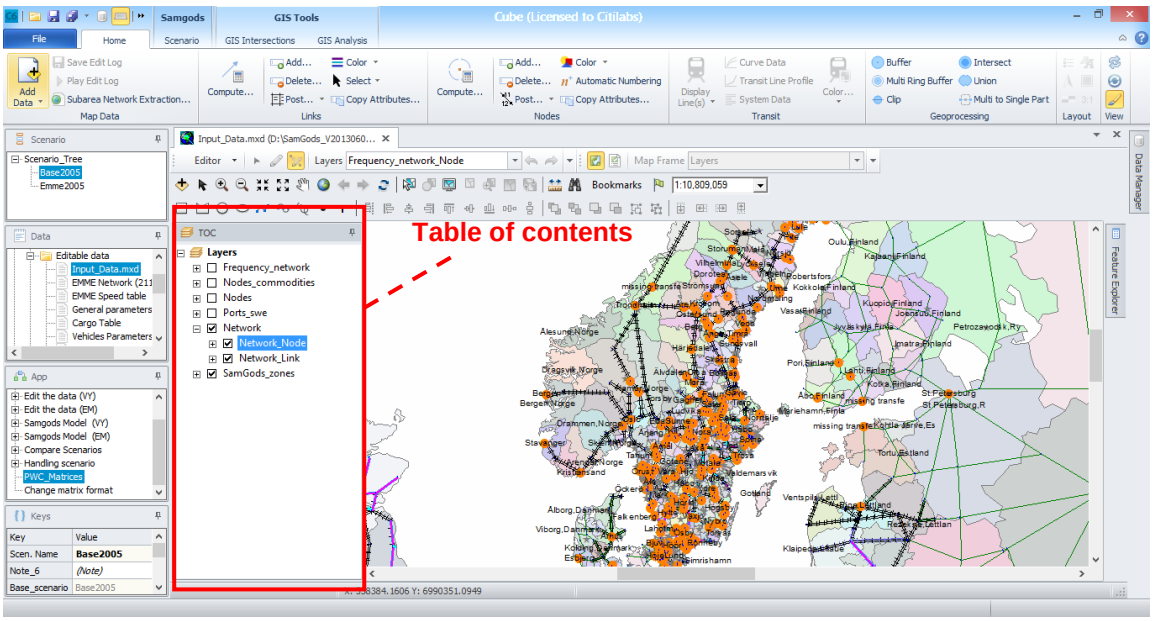


Figure 29 The Table of contents.

2) For the network node and link layers, a set of filter conditions to switch on/off specific modes are also available. To enable/disable the filters, right-click on the node/link layer in the TOC and select “Properties”. In the scroll down menu “Selection Group”, select the desired group and then tick the “Active” check box to activate the option. The filters are by default set as in the last session, which means that a filter can be active even if no

check boxes are ticked. To be sure to turn all filters off, tick and then un-tick an “Active” check box. The available groups for the network node layer are:

a) Road Network

b) Rail Network

c) Sea Network

d) Ferry Network

e) Air Network

f) Zones

The same groups are available for the link layer, except the last one. The advantages of enabling a filter are the possibilities to:

- Visualize only the selected entities
- Select and edit only the visualized entities (and thereby avoid selecting the wrong links)

The best way of using these filters is in conjunction with the default legends: First activate the desired filter(s) for the layer(s) you want to work with and then enable and/or edit the corresponding set(s) of default legends using the icons shown in

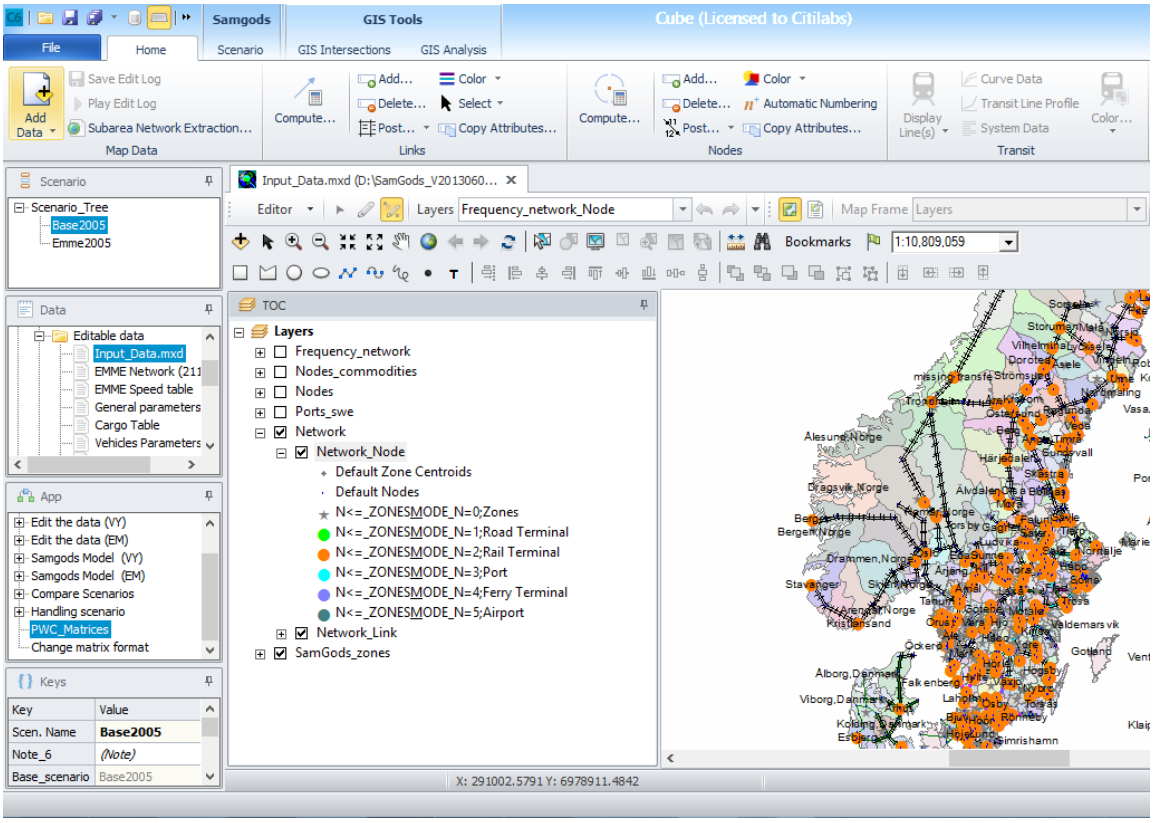


Figure 28.

The layers ticked in the TOC are the ones that are visualized in the GIS window. A layer is selected by clicking on it in the TOC. By selecting Datasets -> Set Selectable Layers… it is possible to set which layers that allow selecting elements. E.g., if the Samgods_zones layer is selected in the TOC but not set as selectable, the zones are shown in the GIS map but cannot be selected with the Select features tool (see below). The default is that all layers are selectable. When editing the GIS data, the layer containing the data that is edited must be selected in the “Layers” drop down menu in the Editor toolbar (see below).

Each layer has an attribute table, which is accessed by right-clicking on the specific layer in the TOC. In the attribute table it is possible to view the attributes of each layer, but not to edit any values. Any edits must be made in the Feature Explorer window (or using the Compute function) and in Edit mode (see below for explanations).

More information on the GIS window can be found in the help section, accessed from the main toolbar: Help -> Cube Help -> Cube Base -> GIS Window.

4.15.1.1. Tools in the GIS window

To select/edit/modify the layers, the following tools are available from the interface:

- Select elements, (fixed) zoom in/out in the map, pan, full extent, refresh view, select features

- Select/view elements via SQL queries based on the attributes in the layers: On the menu bar, select Datasets -> Select by Attributes… and type an SQL syntax, for example all railway nodes in the Stockholm region, in a node layer

- The Editor toolbar, which is used when editing the network

- Add/remove attributes in the layer's table (node or link table) by selecting Node (or Link) -> Attribute -> Add/Delete on the menu bar
- Visualize the attributes for a specific selected element – after an element has been selected using the "Select Features" tool (see first bullet above), the attributes will be displayed in the Feature Explorer window, see Figure 30. In the Edit mode, it is also possible to edit and save the new values directly in the Feature Explorer window. To change to Edit mode, click on Editor -> Start Editing on the Editor toolbar

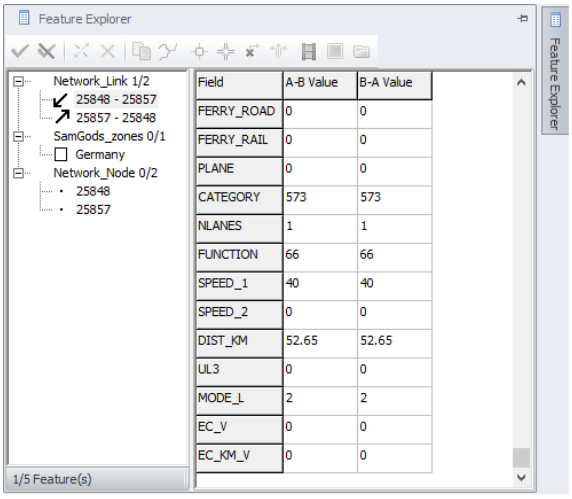


Figure 30 Feature Explorer window

- Modify values based on a condition. Under Link or Node (depends on the type of layer) on the menu bar, the “Compute” option is available when the session is in Edit mode. By selecting “Compute”, access is given to the Feature Class Attribute Calculation window, shown in Figure 31. In this window, it is possible to edit the values and apply a condition (in the example in Figure 31, the capacities for all ports in the Lysekil region are updated, more details on this specific example can be found in Section 5.5)

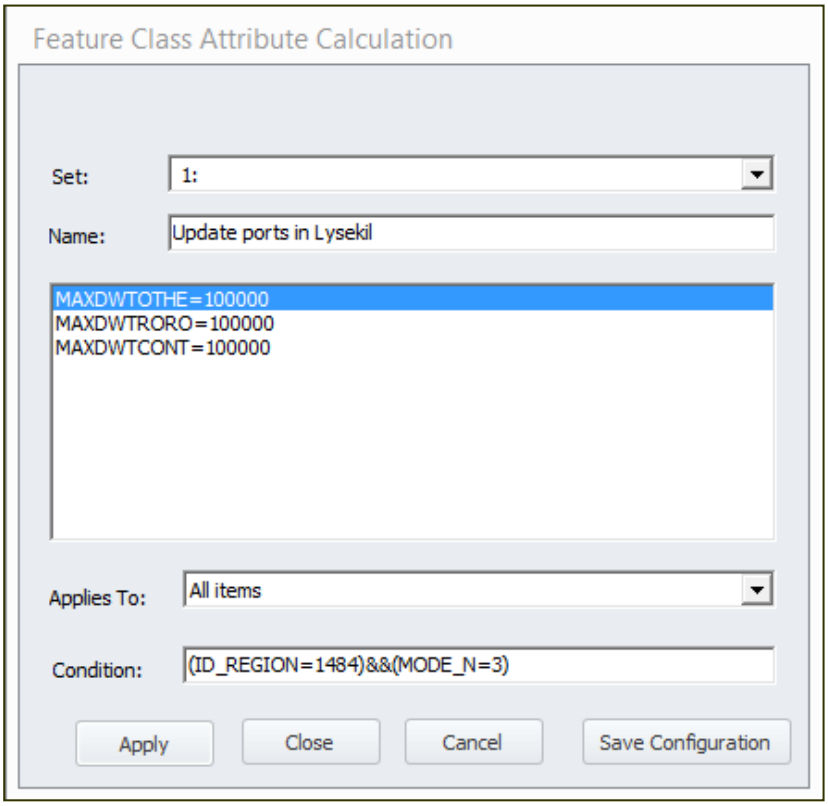


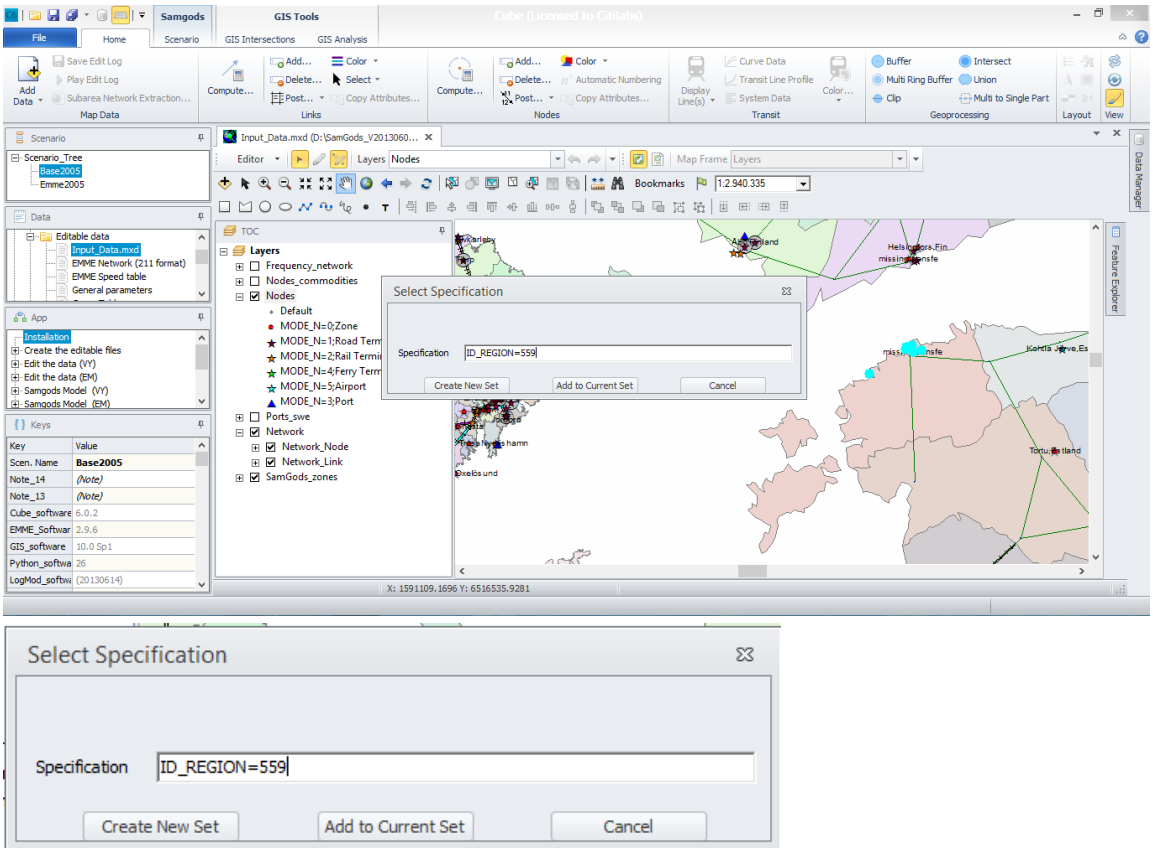
Figure 31 The Feature Class Attribute Calculation window.

4.15.1.2. Attributes available in the node and link layers

It is possible to select an element in a node layer using the following attributes:

- ID_COUNTRY
- ID_REGION (primary key if used in combination with ID_COUNTRY). A list of the country and region codes can be found in the Data Section window, under Scenario Inputs\General tables\Zoning System
- MODE_N (1 – Road terminal, 2 – Rail terminal, 3 – Port, 4 – Ferry terminal, 5 – Airport)

For example, to select all the nodes in a region, the user only needs to select the layer in the TOC and then specify the ID_REGION attribute using Datasets -> Select by attribute… on the main toolbar:



To view all attributes possible to select, right-click in the blank field in the Select Specification window.

For the network link layer the attribute corresponding to MODE_N is MODE_L. To select all the links in a region, do the following:

1) Select the desired region in the map using the Select Features tool (as a suggestion, the Samgods_zones layer should be ticked in the TOC so that the regions are visible)
2) Activate the layer where you want to select elements, in this case the “Network_Link” layer, by clicking on it in the TOC
3) On the menu bar, select Datasets -> Select by Location…
4) In the Select by Location window, set the values indicated in Figure 32
5) Click “Apply”, and then “Cancel” when all specifications have been made

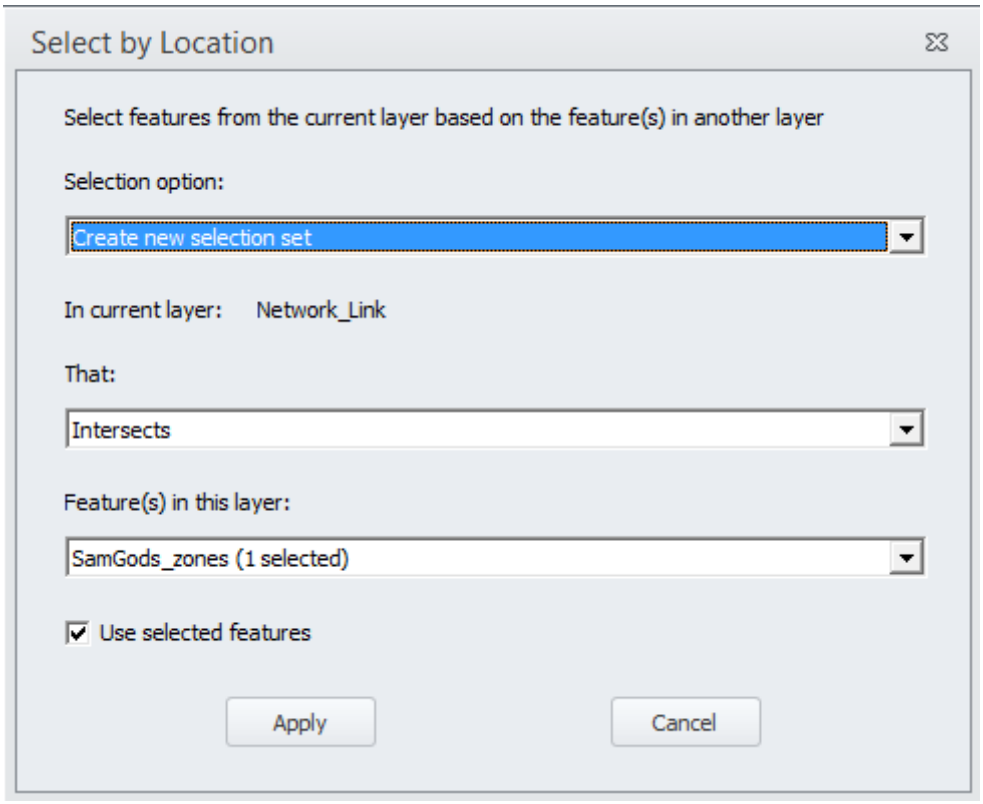


Figure 32 The Select by Location tool.

5. Scenario setup

As for Chapter 4, this chapter describes how to use the Samgods GUI in Voyager applier mode. The parameter settings etc. that are described are visible in Voyager applier mode – e.g. in developer mode not all catalog keys are possible to set. Most of the procedure is the same in the Emme applier mode. The differences appear mainly in the *Edit the data* application and the *Samgods model* application, which are described in detail for Emme users in Sections **Fel! Hittar inte referenskälla.** and 1.

After edits have been made to the scenario according to the instructions below, the changes must be saved to the main geodatabase before running the model. This should be done according to the instructions in Section 4.5.

If you are not sure on how to use the GIS window, the layers, filters and legends, please refer to Section 0 above for a short introduction.

5.1. Introducing a link-based cost

There are different ways to add taxes, tolls and extra costs to one or several links. All of them are added for each vehicle class separately. 6 attributes with different purposes are defined:

- Extra fixed cost per link or set of links (SEK)
- Extra kilometres based cost per link or set of links (SEK/km)
- Country tax: kilometres based tax per country (SEK/km)
- Linkclass tax: fixed tax per link, per link category (SEK)
- Link tax: fixed tax per link (SEK)
- Toll for bridges, fixed tax per link (SEK).

How to edit each one of them is described in the following paragraphs. The three types of taxes (country tax, linkclass tax and link tax) work together, so that only one of them can be applied to a specific link at once. How the different taxes are prioritized is described below, in the section about the link tax. The toll for bridges is added to any tax on a link. It can also be applied to road and rail links that are not bridges. All these four attributes (the three taxes together with the toll for bridges) are edited via tables.

Then there are the two extra cost attributes. They could represent any fee, tax or other cost and are added to any other taxes or tolls for the links where they are defined. They are edited via a GIS layer.

5.1.1.1. Extra cost on a specific link or set of links

In order to add a specific cost to a specific link in the network for a specific vehicle class, do the following:

1) Open the GIS file (Input_Data.mxd), in one of the two possible ways:
   a) Open the Scenario manager window by double clicking on the scenario name in the Scenarios window. In the Scenario manager window, select the *Edit the data* application. Click the “Next…” button and then “Edit…” for the catalog key “ArcMap GIS Project File”
   b) Alternatively, select the scenario by clicking on it in the Scenarios window and open the file from the Data Section window, under Scenario Inputs\Editable data\Input_Data.mxd
2) Select the Network_Link Layer in the TOC window

3) On the menu bar, select Link -> Attribute -> Add
4) In the first popup window, enter the name for the new attribute by considering the following:
   a) If you want to add an attribute as a fixed cost (independent of distance), the label name EC_VXXX, where XXX represents the vehicle class, should be used (in the network all the attributes depend on the vehicle type)
   b) If you want to add an attribute as a parametric cost depending on the distance, the label name EC_KM_VXXX should be used
5) In the second popup window, fill in the variable type (numerical (N) or text (T))
6) Enter the specification for the next new attribute as in 5) and 6). When all attributes have been added, continue to 8)
7) Leave the attribute name blank (without typing anything) and click “OK”

Please note: The label names for the two attributes are managed by two catalog keys in the *Edit the data* application:

- “Attribute name for the extra cost to a specific link [SEK]” – default: EC_V
- “Attribute name for the extra cost to a specific link [SEK/km]” – default: EC_KM_V.

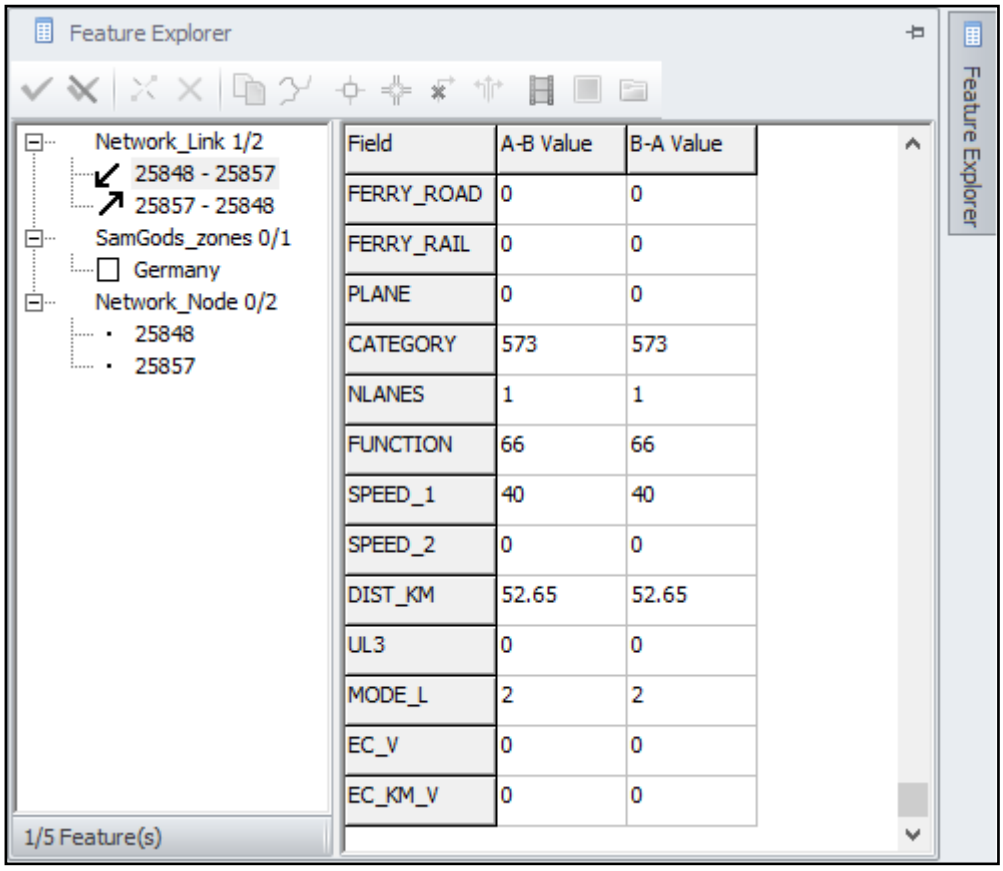
To change the defaults the user only needs to type the new label names in these catalog keys. If the defaults are changed, the new label names must be used when setting the attributes as described above, The vehicle type code has to be placed at the end of the attribute name, e.g.

- COST_KM101
- FEES_201.

So if the user e.g. wants to use the attribute name “COST_KM101” for vehicle type 101, the catalogue key should be set to “COST_KM”. Wrong definitions (beginning with an number or containing blank entries):

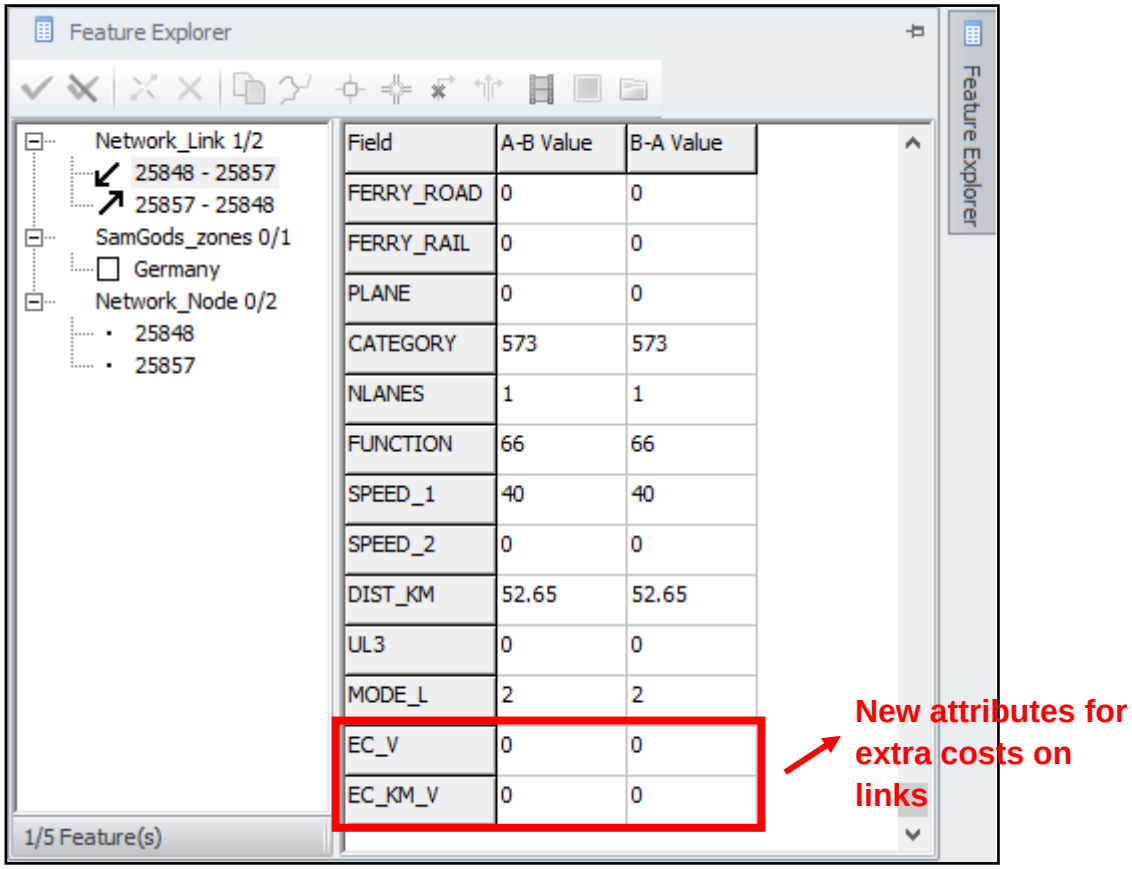
- 105COST
- 204 test
- 204test.

Each link in the network will now have the structure displayed in



Field	A-B Value	B-A Value
FERRY_ROAD	0	0
FERRY_RAIL	0	0
PLANE	0	0
CATEGORY	573	573
NLANES	1	1
FUNCTION	66	66
SPEED_1	40	40
SPEED_2	0	0
DIST_KM	52.65	52.65
UL3	0	0
MODE_L	2	2
EC_V	0	0
EC_KM_V	0	0

Figure 33 below. The user can see this in the Feature Explorer window by selecting a link using the “Select Features” tool.



Field	A-B Value	B-A Value
FERRY_ROAD	0	0
FERRY_RAIL	0	0
PLANE	0	0
CATEGORY	573	573
NLANES	1	1
FUNCTION	66	66
SPEED_1	40	40
SPEED_2	0	0
DIST_KM	52.65	52.65
UL3	0	0
MODE_L	2	2
EC_V	0	0
EC_KM_V	0	0

Figure 33 Feature Explorer window.

8) In the Editor toolbar, select Editor -> Start editing. In the “Layers” drop down menu select the “Network_Link” layer

- To edit a single link, do the following:

1) Use the “Select features” tool to select the specific link

2) In the Feature Explorer window, type in the value of the tax or cost in the new attribute cell

3) Save the edit by clicking the green icon on the top left

4) Close the Feature Explorer window

5) In the Editor toolbar select Editor -> Stop Editing

6) To the question “Do you want to save your edits?”, click “Yes”

7) Close the GIS window by clicking on the X icon without saving the ArcGIS Map Document (*.mxd) (if any edits to the legends and/or the layout have been made, the map could be saved, otherwise this is not necessary)

- To edit a list of links based on attribute conditions, do the following:

1) Under the main toolbar, select Datasets -> Select by Attributes…

2) In the Select Specification window, right click in the blank field to see the attribute list (note: it only shows attributes from the active layer – to access other attributes, select another layer in the TOC), select the attribute for applying the condition (in the example in Figure 34, select all the links on mode 5 – air)

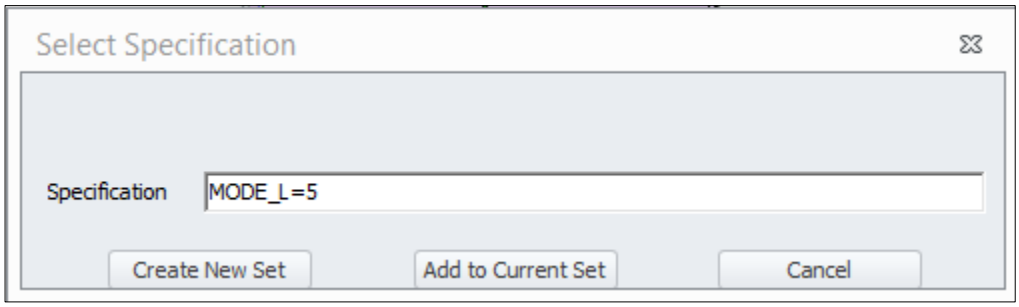


Figure 34 The Select Specification window.

3) Click “Create New Set”

4) Select Link -> Compute... in the menu bar to access the Link Attribute Calculation window, see Figure 35

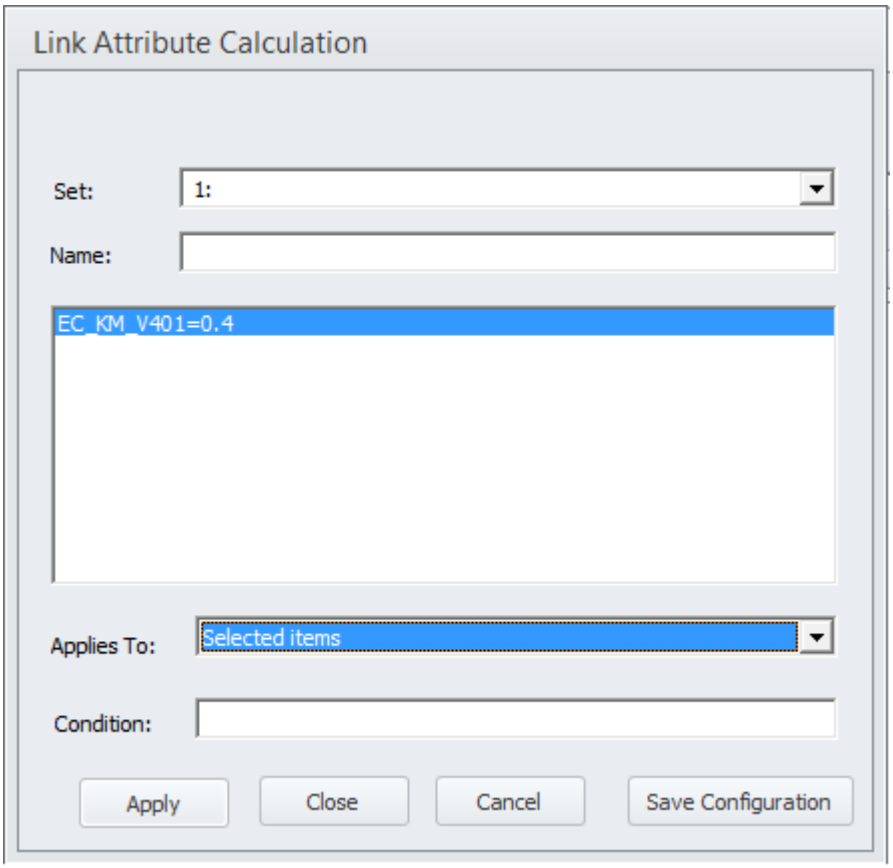


Figure 35 The Link Attribute Calculation window.

5) Fill in the fields, see Figure 35. To insert edits in the main field in the middle, right click and select “Insert”. A window, “Insert Equation”, pops up – right-click in the blank field and select the attribute you want to edit, e.g. EC_KM_V401 as in Figure 35, and type in “=” followed by the value. More attributes could be edited by repeating the procedure. In the “Applies To:” drop down menu, select “Selected items”
6) Click ”Apply”. An information window shows the total number of links updated. Click “OK” and then “Close”
7) Under the Editor toolbar, select Editor -> Stop Editing
8) To the question “Do you want to save your edits?”, click “Yes”
9) Close the GIS window by clicking on the X icon without saving the ArcGIS Map Document (*.mxd) (if any edits to the legends and/or the layout have been made, the map could be saved, otherwise this is not necessary)

- To edit a list of links based on a geographical selection, do the following:

1) Select the “Samgods_zones” layer in the TOC
2) In the main toolbar, select Datasets -> Select by Attributes…
3) In the Select Specification window, right click in the blank field to see the attribute list (note: it only shows attributes from the active layer – to access other attributes, select another layer in the TOC), and select the attribute for applying the condition (in the example in Figure 36, select the Stockholm region). For a list of the region and country codes, open the table Scenario Inputs\General tables\Zoning Systems in the Data Section window

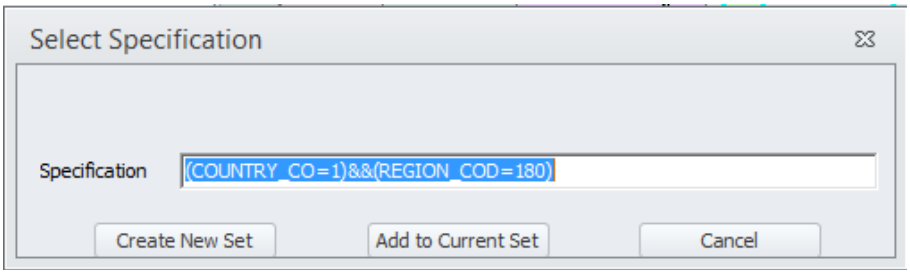


Figure 36 The Select Specification window.

4) Click “Create New Set”
5) Select the “Network_link” layer in the TOC
6) On the main toolbar, select Datasets -> Select by Location... to access the window in Figure 37 where appropriate changes can be done

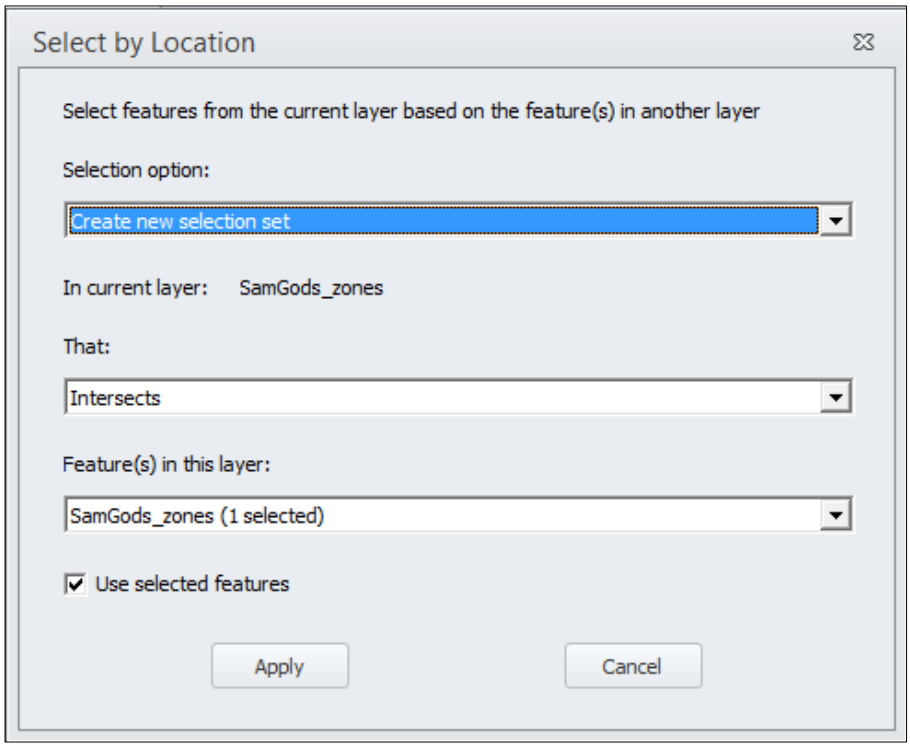


Figure 37 The Select by Location window.

7) Click “Apply”. An information window shows the total number of links selected. Click “OK” and then close the window by clicking “Cancel”
8) Select Link -> Compute on the main toolbar to access the Link Attribute Calculation window, see Figure 38

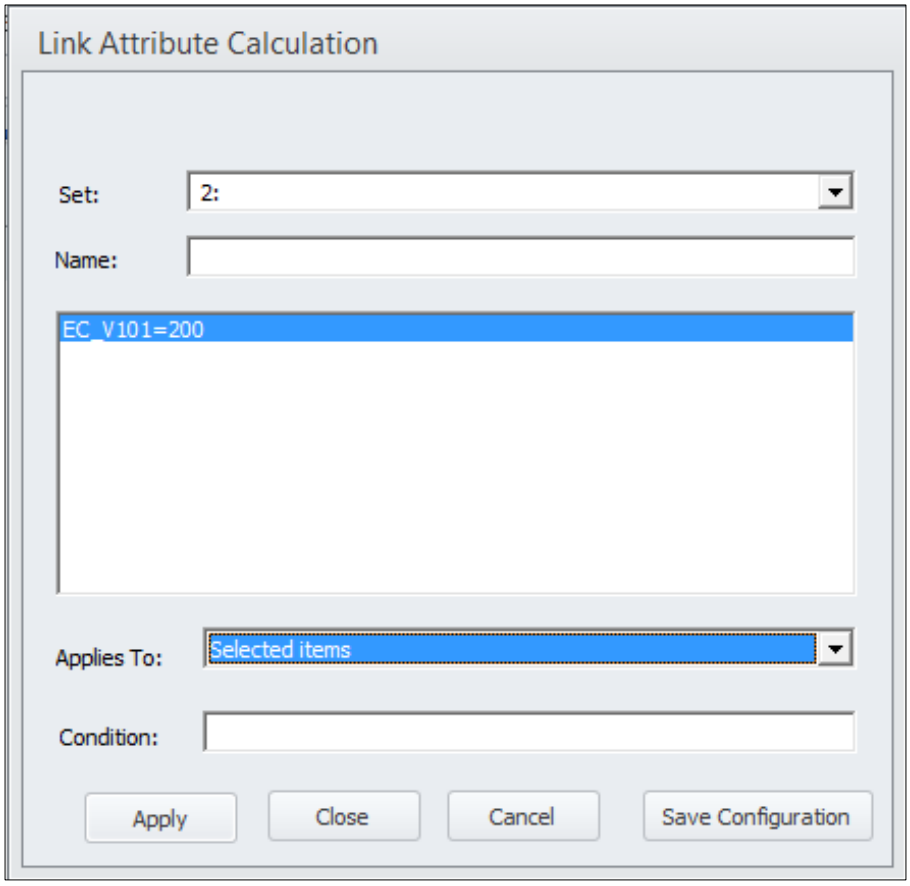


Figure 38 The Link Attribute Calculation window.

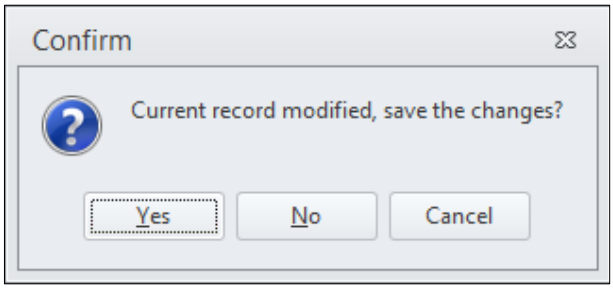
9) Fill in the fields. To insert edits in the main field in the middle, right click and select “Insert”. A window, “Insert Equation”, pops up – right-click in the blank field and select the attribute you want to edit, e.g. EC_V101 as in Figure 38, and type in “=” followed by the value. More attributes could be edited by repeating the procedure. In the “Applies To:” drop down menu, select “Selected items”
10) Click “Apply”. An information window shows the total number of links updated. Click “OK” and then “Close”
11) On the Editor toolbar, select Editor -> Stop Editing
12) To the question “Do you want to save your edits?”, click “Yes”
13) Close the GIS window by clicking on the X icon without saving the ArcGIS Map Document (*.mxd) (if any edits to the legends and/or the layout have been made, the map could be saved, otherwise this is not necessary)

5.1.1.2. Country tax – kilometer-based

The user can apply a country tax for road and rail modes, differentiated by the vehicle type. For the other modes (sea, ferry and air), the tax can only be differentiated between inside and

outside of Sweden, since the links for these modes are not divided between other countries in the Samgods model.. To edit the country tax, do the following:

1) Click the “Edit…“ button for the “Table with tax by country (SEK/km) [Table]”catalog key in the *Edit the data* application, or open the Scenario Inputs\Editable data\Tax by country Table from the Data section window, for the selected scenario
2) To modify existing values, just type a new value in the SEK_KM attribute and press Enter
3) To add a new tax, the user must know the country code (ID_COUNTRY). To access the country codes, please refer to the table Scenario Inputs\General tables\Zoning system in the Data section window
    a. Add a new row in the Tax by Country table by clicking the “+” icon
    b. Type in the country code, the vehicle type and the SEK_KM value (the country name is not required)
4) Close the Tax by Country table by clicking on the X icon in the top right corner and click “Yes” to the question:



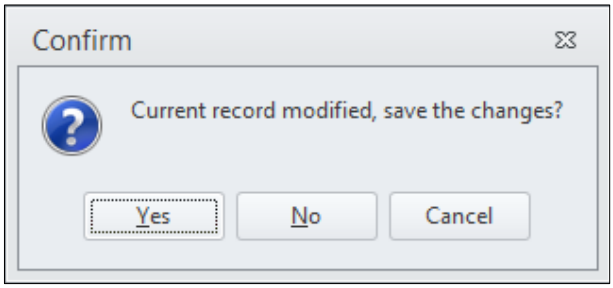
Please note: For sea, ferry and air modes (vehicles class numbers greater then 209) the user can only apply two country codes:

- ID_COUNTRY=1 for Sweden (as above)
- ID_COUNTRY=-1 for all countries outside Sweden.

5.1.1.3. Linkclass tax

The user can apply a tax per link for a specific category of links in the network. This is done in the following way:

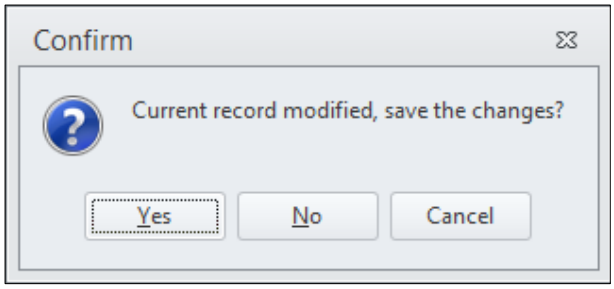
1) Click “Edit“ for the “Tax by Category (SEK) [Table]” catalog key in the *Edit the data* application or open Scenario Inputs\Editable data\Tax by Linkclass from the Data Section window for the specific scenario
2) To modify existing values, just type in a new value in the SEK attribute and press Enter
3) To add a new tax, the user must know the category (LINKTYPE). To access the category codes, open Scenario Inputs\General tables\LinkCategories values from the Data section window
    a) Add a new row in the Tax by Linkclass table by clicking the “+” icon
    b) Type in the LINKTYPE value, the vehicle class and the SEK value
4) Close the Tax by Linkclass table by clicking on the X icon in the top right corner and click “Yes” to the question:



5.1.1.4. Link tax

The user can apply a tax for a specific link in the network. This is done in the following manner:

1) Click “Edit…“ for the “Tax by Link (SEK) [Table]” catalog key in the *Edit the data* application, or open Scenario Inputs\Editable data\Tax by Link from the Data section window for the specific scenario
2) To modify an existing value, just type in a new value in the SEK attribute and press Enter
3) To add a new tax, the user must know the start (A) and end (B) node for the link in the network. To visualize the network, open the Input_Data.mxd file, e.g. from the Data Section window. The A and B node numbers can be accessed e.g. by selecting the link with the Select Features tool and looking in the Feature Explorer window
    a. Add a new row in the Tax by Link table by clicking the “+” icon
    b. Type in the A and B values (start and end node for the link), the vehicle class and the SEK value. In order to have the tax in both directions of the link, the link must be added twice, one row for each direction (where the A and B nodes are exchanged in the second row)
4) Close the Tax by Link table by clicking the X icon in the top right corner and click “Yes” to the question:



Please note: Introducing a link with a zero tax value for a specific vehicle type has the effect that all the extra costs (in term of taxes) are set to zero. The same principle applies to the Tax by Linkclass table regarding the Country tax value.

The general rule applied in the model is that

TAX_COUNTRY <- TAX_LINKCLASS <- TAX_LINK

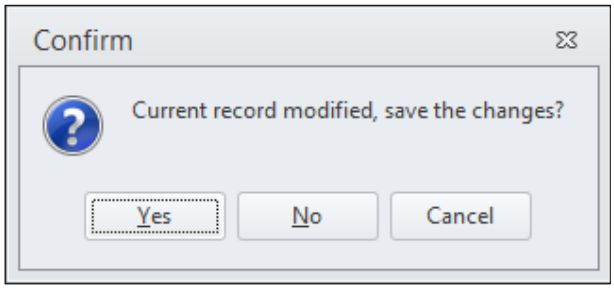
If several tax values are assigned to a specific link, e.g. one from the country table, another one from the linkclass table and a third one from the link table, each value will be overwritten by the subsequent value in the order above, i.e. the smaller scale always overrides the larger (disregarding of the actual value of the tax).

Please observe that this rule does not apply to the Toll bridges table or the extra cost values in the network – they are added to any other taxes.

5.1.1.5. Toll bridges

In the network, there are a few bridges with fixed tolls. The Toll bridges table contains the values of the tolls. The user can modify them or add new bridge tolls in the following manner:

1) Click “Edit…“ for the “Toll for bridges (SEK) [Table]” catalog key in the *Edit the data* application, or open Scenario Inputs\Editable data\Toll bridges from the Data section window for the specific scenario
2) To modify an existing value, just type in a new value in SEK attribute and press Enter
3) To add a new toll, the user must know the start (A) and end (B) node for the link in the network. To visualize the network, open the Input_Data.mxd file, e.g. from the Data Section window. The A and B node numbers can be accessed e.g. by selecting the link with the Select Features tool and looking in the Feature Explorer window
    a. Add a new row in the Toll bridges table by clicking the “+” icon
    b. Type in the A and B values (start and end node for the link), the vehicle class and the SEK value. In order to have the tax in both directions of the link, the link must be added twice, one row for each direction (where the A and B nodes are exchanged in the second row)
4) Close the Toll bridges table by clicking the X icon in the top right corner and click “Yes” to the question:



5.2. Change the loading costs and times in terminals for different types of cargo

The costs and times for loading cargo inside the terminals are specified for different types of cargo – containers, general cargo non containers, dry bulk non containers and liquid bulk non containers.

1) Open the vehicle parameters table by clicking “Edit…” for the “General parameters of vehicle classes [Table]” catalog key in the Edit the data application, or open Scenario Inputs\Editable data\Vehicles Parameters from the Data section window for the specific scenario
2) For each vehicle class, edit the values for the attributes below by typing in the new value and the press Enter:
    - load time containers in hours/vehicle (not divided by type of commodity) – attribute CONT_LTI
    - load cost containers in SEK/tonne (not divided by type of commodity) – attribute CONT_LCO
    - load time general cargo non containers in hours/vehicle – attribute NC_LTI_GC
    - load time dry bulk non containers in hours/vehicle – attribute NC_LTI_DRY
    - load time liquid bulk non containers in hours/vehicle – attribute NC_LTI_LIQ

- load cost general cargo non containers in SEK/tonne – attribute NC_LCO_GC
- load cost dry bulk non containers in SEK/tonne – attribute NC_LCO_DRY
- load cost liquid bulk non containers in SEK/tonne – attribute NC_LCO_LIQ.

3) Close the table by clicking the X icon in the top right corner
4) On request, click “Yes” to save the edits

5.3. Change the average value (SEK) of the commodities

1) Open the commodity table by clicking on “Edit” on the “Commodity data [Table]” catalog key using the Edit the data application, or open Scenario Inputs\Editable data\Cargo Table from the Data section window, for the specific scenario
2) Edit the values by commodity class for: VALUE_SEKT (SEK/Tonne)
3) Close the table by clicking the X icon in the top right corner
4) On request, click “Yes” to save the edits

5.4. Change vehicle data

Change vehicle parameters (e.g. cost per km and hour, capacity, etc,) in the Vehicles Parameters table the following way:

1) Open the Vehicles Parameters table by clicking the “Edit” button on the “General parameters of Vehicle classes [Table]” catalog key using the *Edit the data* application, or open Scenario Inputs\Editable data\Vehicles Parameters from the Data section window for the specific scenario (same table as in Section 5.2)
2) Edit the values for any attribute(s) by vehicle class
3) Close the table by clicking the X icon in the top right corner
4) On request, click “Yes” to save the edits

In the vehicles Parameters table is also the parameter that governs whether the empty vehicle matrices will be produced or not. For each vehicle class it is possible to set the parameter “EMPTY_V” to 1 (i.e. produce empty vehicle matrices) or 0 (i.e. not produce empty vehicle matrices). If the user chooses not to produce the empty vehicle matrices, the matrices will instead be filled in with zeroes. For more information on the computation of empty vehicles, please refer to the appendix.

5.5. Change capacity in ports

The user can change the values for the following port parameters:

- MaxDwtCont (maximum deadweight tonnage, container vessel)
- MaxDwtRoRo (maximum deadweight tonnage, ro/ro vessel)
- MaxDwtOthe (maximum deadweight tonnage, other vessels)

This is done in the following way:

1) Click “Edit” on the “ArcMap GIS Project File” catalog key using the *Edit the data* application, or open Scenario Inputs\Editable data\Input_Data.mxd from the Data section window for the specific scenario
2) Select the “Nodes” layer in the TOC window and tick the check box if it is not already ticked
3) Start an Edit session (select Editor -> Start Editing on the Editor toolbar)
4) Select the “Nodes” layer in the “Layers” scroll down menu on the Editor toolbar

5) Select the terminal(s) by using the Select Features tool, or by setting a selection condition (e.g., rail terminals: MODE_N=2 in Sweden). For instructions on how make a selection based on attributes, please refer to Section 0
6) Select Node -> Compute and type in the equations by right-clicking in the largest field (in the middle) and select “Insert” (e.g., MAXDWTRORO=100 000, see Figure 39. To see the available parameters, right-click in the blank field in the Insert Equation window) and select which items the edits should apply to (all or selected). Click “Apply”. When finished, click “Close”

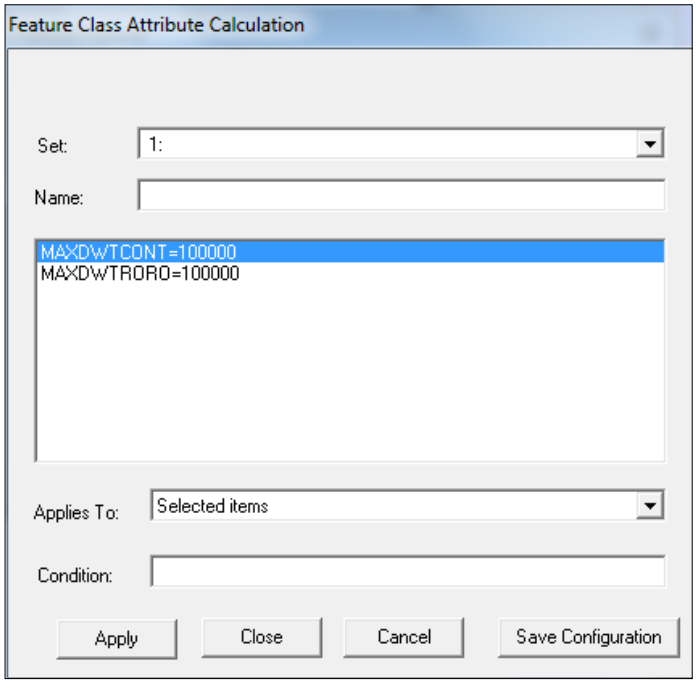


Figure 39 The Feature Class Attribute Calculation window.

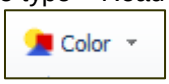
7) On the Editor toolbar, select Editor -> Stop Editing
8) To the question “Do you want to save your edits?”, click “Yes”
9) Close the GIS window by clicking the X icon without saving the ArcGIS Map Document (*.mxd) (if any edits to the legends and/or the layout have been made, the map could be saved, otherwise this is not necessary)

5.6. Introduce new infrastructure

When adding new infrastructure it is recommended to use the filter function as described below. Then only links and nodes with specific modes and/or categories are shown in the GIS window. However, a new link has category = 0. When having created a new link, the attributes, including the link category, could be edited directly as described below. However, if the editing of the link is interrupted, e.g. by selecting another element or closing the Feature Explorer window before the edits are finished, the new link can become invisible in the map because of the filter. In order to be able to select it again and continue the edits, the filter must be disabled.

The edits made are not always visible at once in the Feature Explorer. In order to see exactly which edits that have been made for a selected link, close the Feature Explorer and open it again to refresh it.

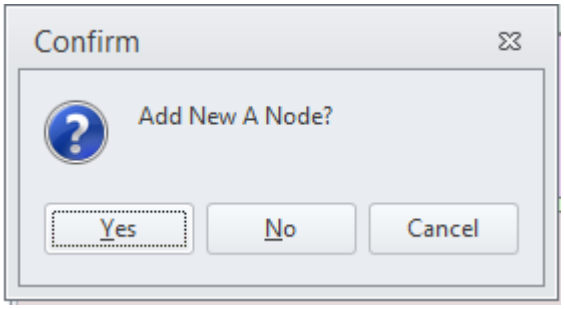
5.6.1.1. New roads

1) Click “Edit” on the “ArcMap GIS Project File” catalog key using the *Edit the data* application, or open Scenario Inputs\Editable data\Input_Data.mxd from the Data section window for the specific scenario
2) Activate the filter for the road mode both in the network node and the link layers by right-clicking on the respective layer in the TOC, selecting “Properties” and tick the “Active” check box for road mode
3) Select the Network_Link layer in the TOC
4) Select the node default legend “2:Node type – Road” in the menu accessed by clicking on the left downwards-pointing arrow: 

5) Start an edit session (click Editor -> Start editing)
6) Select the Network_Link layer in the “Layers” drop down menu

> **Tip:** Instead of specifying the new link from the beginning, as described in this paragraph, it is possible to select an existing nearby link, with attributes similar to the new link, and in the Feature Explorer window use the copy function. Click , and then create the new link as described below and change only the attributes that differ from the other link. In this way it is easier to avoid making mistakes when specifying the attributes.

7) Select the pencil icon
8) Draw the new link. This is done by clicking where the new link should start and for each new click on the map, a new vertex is created. At the end of the link, double-click
9) The following window will appear if new a node is added (i.e. if the link does not start and end in existing nodes):



10) Click “Yes” and then select a node value greater than 2000 (values up to 1999 are only for terminals and zones), see Figure 40
11) Click “OK”

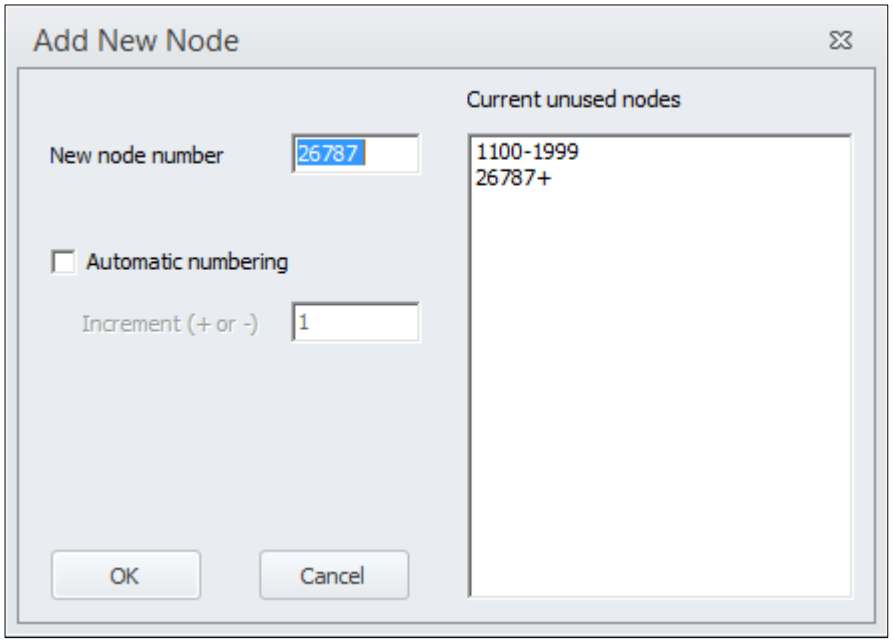
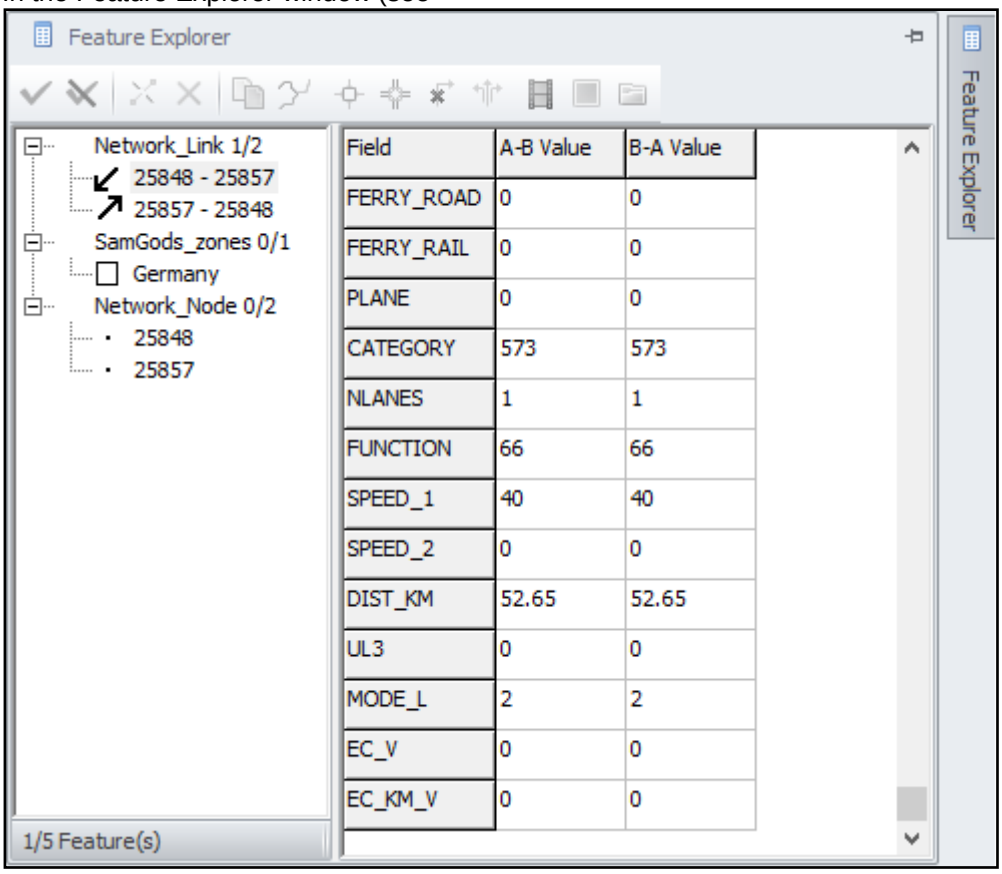


Figure 40 The Add New Node window.

12) In the Feature Explorer window (see



13) Figure 33, on page 105), specify the following values. In order to assign the same values to both directions (A to B and B to A), make sure that both ways are selected in the Feature Explorer window

   a) ALL_M=1 (always equal to 1, which means that it is an open link)

   b) LORRY_40T=1 (1 if open for vehicle types 102, 103 and 104, 0 otherwise)

   c) LORRY_60T=1 (1 if open for vehicle type 105, 0 otherwise)

d) CAR=1 (1 if open for vehicle type 101, 0 otherwise)

e) Leave all the other modes as zero

f) CATEGORY: type the category number – see available numbers and descriptions in the Data Section window, under Scenario Inputs\General tables\Link Categories

g) NLANES: number of lanes in each direction

h) FUNCTION: speed flow curve – see V101/102 tables in the Data Section window under Scenario Input/General tables (values between 1 and 50, 61 only for connectors and other modes)

i) SPEED_1:speed in km per hour for vehicle class 101

j) SPEED_2: speed in km per hour for vehicle classes 102, 103, 104 and 105

k) DIST_KM: update using the SHAPE_LENGTH value using Link -> Compute tool as displayed in Figure 41 (note that “Selected items” must be selected in the “Applies To:” field)

l) MODE_L=1, because it is a road link

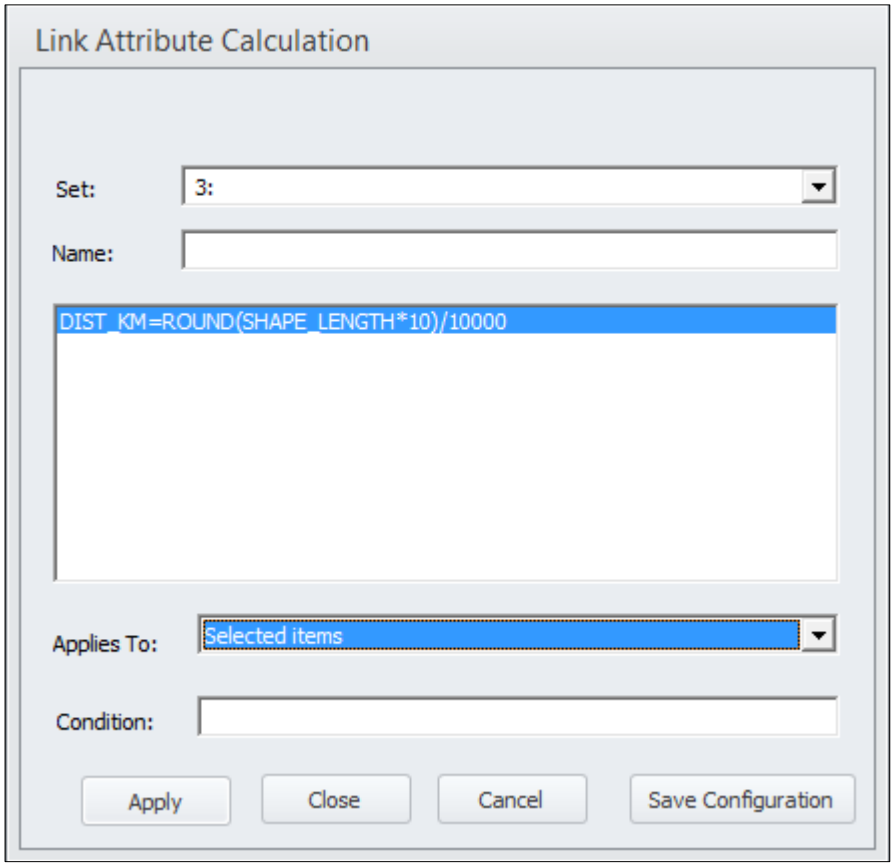


Figure 41 The Link Attribute Calculation window.

Please note: It is recommended to round the distance values to avoid excessive number of digits after the comma.

14) Select in the Feature Explorer window the node or nodes created (they can be found to the left of the table of attributes). Answer “Yes” to the question whether the edits should be saved. Edit the following attributes:

a) ID_COUNTRY and ID_REGION: the values are easily identified using the zoning system feature class. Select the zone and it will be visualized in the Feature Explorer

window with the attributes for the zone (this is preferably done before starting to edit the new link/node, since selecting the zone will un-select the new link and node). As an alternative, the table “Zoning System”, found in Scenario Inputs\General tables in the Data Section window, can be consulted

b) MODE_N=1 because it is a road node

c) All the other attributes will be filled in automatically by the model

15) On the Editor toolbar, select Editor -> Stop Editing

16) To the question “Do you want to save your edits?”, click “Yes”

17) Close the GIS window by clicking the X icon without saving the ArcGIS Map Document (*.mxd) (if any edits to the legends and/or the layout have been made, the map could be saved, otherwise this is not necessary)

5.6.1.2. New railroad

1) Click “Edit” on the “ArcMap GIS Project File” catalog key using the *Edit the data* application, or open Scenario Inputs\Editable data\Input_Data.mxd from the Data section window for the specific scenario

2) Activate the filter for the rail mode, both in the network node and the link layer by right-clicking on the respective layer in the TOC, selecting “Properties” and tick the “Active” check box for rail mode

3) Select the Network_Link layer in the TOC

4) Select the node default legend “3:Node type-Rail”, in the menu accessed by clicking the left downwards pointing arrow:

5) Start an edit session (select Editor -> Start Editing)

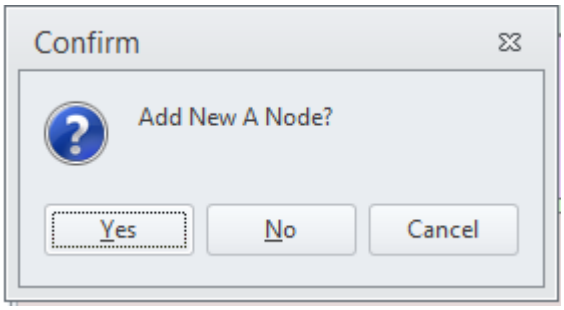
6) In the “Layers” drop down menu, select the Network_Link layer

Tip: Instead of specifying the new link from the beginning, as described in this paragraph, it is possible to select an existing nearby link, with attributes similar to the new link, and in the Feature Explorer window use the copy function. Click , and then create the new link as described below and change only the attributes that differ from the other link. In this way it is easier to avoid making mistakes when specifying the attributes.

7) Select the pencil icon

8) Draw the new link. This is done by clicking where the new link should start and for each new click on the map, a new vertex is created. At the end of the link, double-click

9) The following window will appear if a new node is added (i.e. if the link does not start and end in existing nodes):



10) Click on “Yes” and then select a node value greater than 2000 (values between 1173 and 1999 are only for terminals and zones), see Figure 42

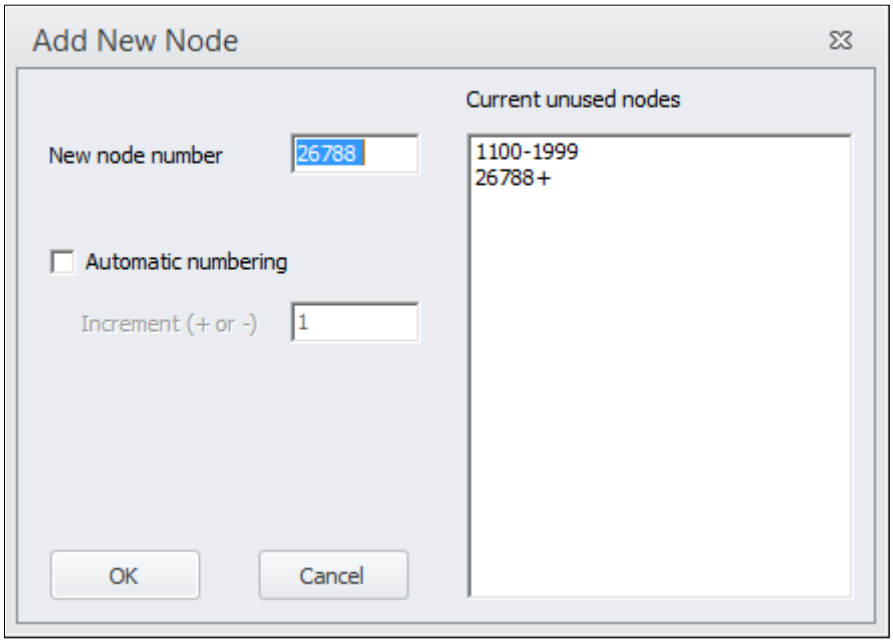


Figure 42 The Add New Node window.

11) Click “OK”

12) In the Feature Explorer window, specify the following values. In order to assign the same values to both directions (A to B and B to A), make sure that both ways are selected in the Feature Explorer window
    a) ALL_M=1 (always equal to 1, which means that it is an open link)
    b) COMBI=1 (1 if open for vehicle type 201, 0 otherwise)
    c) FEEDER1=1 & FEEDER2=1 (1 if open for vehicle type 202, 0 otherwise)
    d) STAX225=1 (1 if open for vehicle type 204, 0 otherwise)
    e) STAX25=1 (1 if open for vehicle type 205, 0 otherwise)
    f) STAX30=1 (1 if open for vehicle type 206 , 0 otherwise)
    g) WAGONLOAD=1 (1 if open for vehicle type 207,208,209, 0 otherwise)
    h) CATEGORY: type the category number – see available numbers and descriptions in the Data Section window, under Scenario Inputs\General tables\Link Categories
    i) NLANES: number of lanes in each direction
    j) FUNCTION=61 (always this value except for road mode)
    k) SPEED1: Speed in km/h
    l) SPEED2=0

m) DIST_KM: update using the SHAPE_LENGTH value using Link -> Compute tool as displayed in Figure 43 (note that “Selected items” must be selected in the “Applies To:” field)

n) MODE_L=2, because it is a rail link

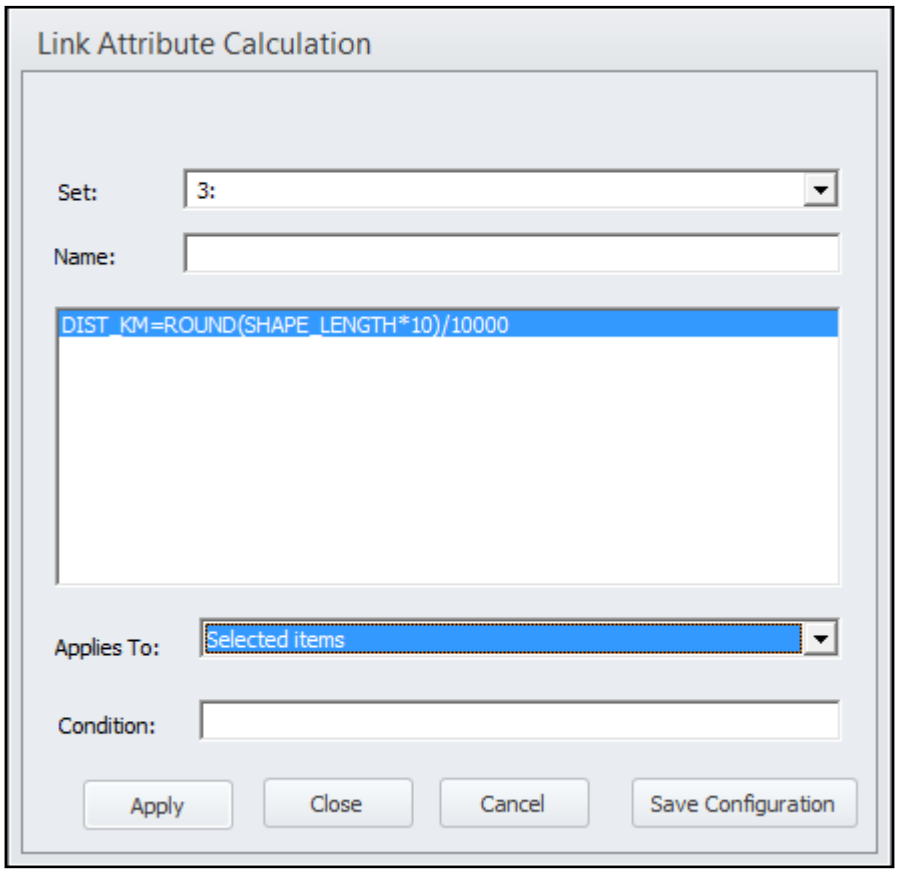


Figure 43 The Link Attribute Calculation window.

Please note: it is recommended to round the distance values to avoid excessive number of digits after the comma.

13) Select in the Feature Explorer window the created node or nodes (they can be found to the left of the table of attributes). Answer “Yes” to the question whether the edits should be saved. Edit the following attributes:

a) ID_COUNTRY and ID_REGION: the values are easily identified using the zoning system feature class. Select the zone and it will be visualized in the Feature Explorer window with the attributes for the zone (this is preferably done before starting to edit the new link/node, since selecting the zone will un-select the new link and node). As an alternative, the table “Zoning System”, found in Scenario Inputs\General tables in the Data Section window, can be consulted

b) MODE_N=2 because it is a rail node

c) All the other attributes will be automatically filled by the model

14) On the Editor toolbar, select Editor -> Stop Editing

15) To the question “Do you want to save your edits?”, click “Yes”

16) Close the GIS window by clicking the X icon without saving the ArcGIS Map Document (*.mxd) (if any edits to the legends and/or the layout have been made, the map could be saved, otherwise this is not necessary)

5.6.1.3. New sea, ferry and air links

New links for these modes could also be added, in a similar manner as for the road and rail links.

5.6.1.4. New terminals

The terminals are represented inside the network as zones. They could be distinguished from the actual zones by their node number, which does *not* end with 00 (“actual” zones here means starting and ending points for trips, whereas terminals are intermediate steps. Actual zones could also be terminals, in the case of Direct Access. The actual zones have NORIG numbers that end with 00).

To add a new terminal, different actions are required depending on the mode of the terminal. The new terminal needs to be added in three layers: the Network layer, the Nodes_commodities layer, and the Nodes layer.

Road terminal

Network layer:

1) Click “Edit” on the “ArcMap GIS Project File” catalog key using the *Edit the data* application, or open Scenario Inputs\Editable data\Input_Data.mxd from the Data section window for the specific scenario
2) Activate the filter for road mode both in the network node and link layer (please refer to Section 0 for instruction on how to do this)
3) Select the node default legend “2:Node type – road” (see Section 0)
4) Select the Network_Node layer in the TOC
5) Start an edit session (on the Editor toolbar, select Editor -> Start Editing)
6) In the “Layers” drop down menu, select the Network_Node layer
7) Select the pencil icon
8) Add the new node by clicking on the location and selecting a node number between the highest zone number and 2000 (select a number less than 2000 in the range specified in the window “Current Unused Numbers”)
9) Click “OK”
10) In the node table in the Feature Explorer window, type in the following information:
    a) ID_COUNTRY and ID_REGION: the values are easily identified using the zoning system feature class. Select the zone and it will be visualized in the Feature Explorer window with the attributes for the zone (this is preferably done before starting to edit the new node, since selecting the zone will un-select the new node). As an alternative, the table “Zoning System”, found in Scenario Inputs\General tables in the Data Section window, can be consulted
    b) MODE_N=1, because it is a road terminal
11) In order to change the number of zones for the entire network, right-click on the Network layer in the TOC and select “Properties”. Change the Highest Zone No. to the number of the just added terminal and click “OK”, see Figure 44

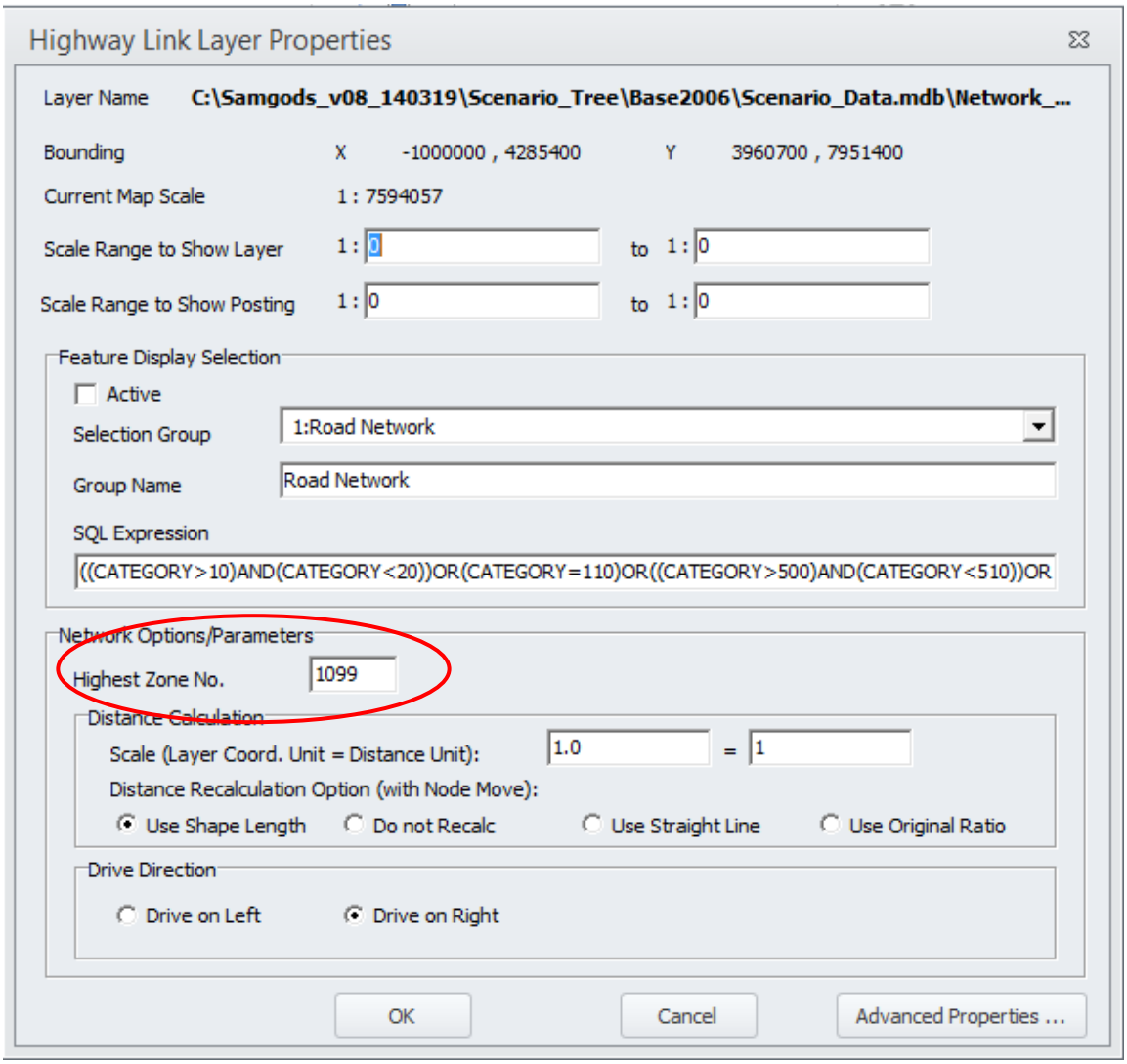


Figure 44 How to change the number of zones for the entire network.

12) Select the Network_Link Layer in the “Layers” drop down menu. To the question whether the changes should be saved, answer “Yes”. Using the new node as a starting node, draw a link connector from the node to the road network, as described in the New roads section above. Then type in the following information in the Feature Explorer window. In order to assign the same values to both directions (A to B and B to A), make sure that both ways are selected in the Feature Explorer window:
    a) ALL_M=1 (always equal to 1, which means that it is an open link)
    b) LORRY_40T=1 (1 if open for vehicle types 102, 103 and 104, 0 otherwise)
    c) LORRY_60T=1 (1 if open for vehicle type 105, 0 otherwise)
    d) CAR=1 (1 if open for vehicle type 101, 0 otherwise)
    e) Leave all the other modes as zero
    f) CATEGORY=110 or 201 (see available numbers and descriptions in the Data Section window, under Scenario Inputs\General tables\Link Categories)
    g) NLANES=1
    h) FUNCTION=61
    i) SPEED_1=50

j) SPEED_2=0

k) DIST_KM: update using the SHAPE_LENGTH value using Link -> Compute tool as displayed in Figure 45

l) MODE_L=1 because it is a road link

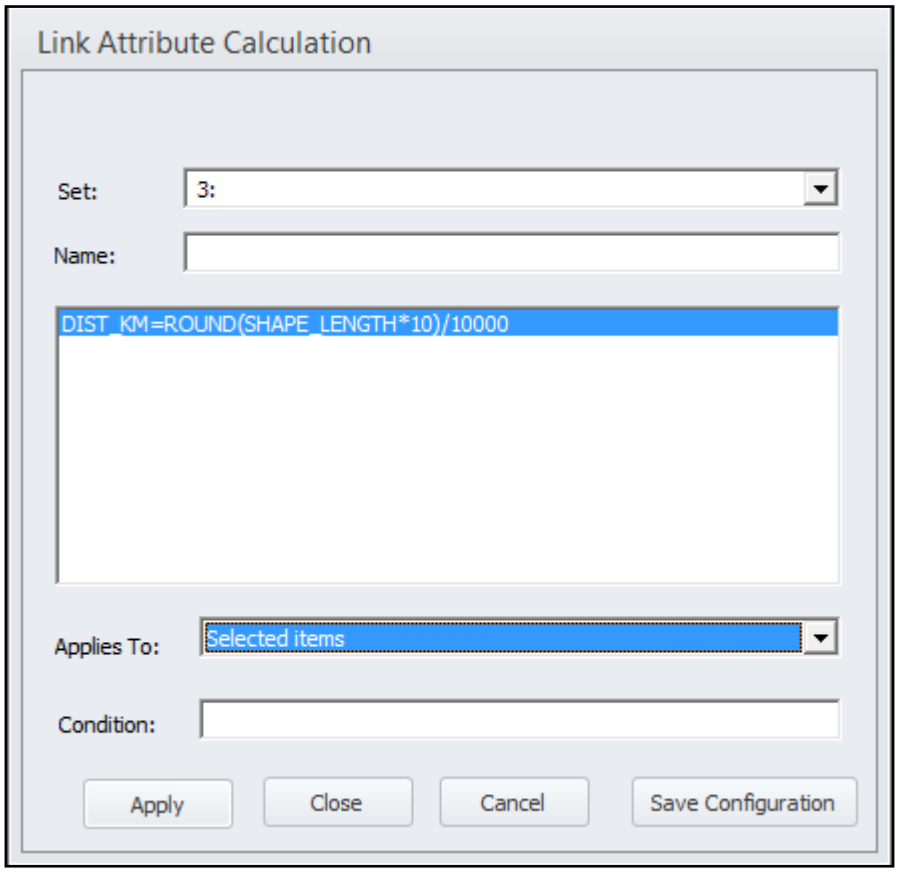


Figure 45 The Link Attribute Calculation window.

Please note: it is recommended to round the distance values to avoid excessive number of digits after the comma

Nodes_commodities layer:

1) In the “Layers” drop down menu, select the Nodes_commodities layer. Answer “Yes” to the question whether to save the changes to the selected feature
2) Tick and select the Nodes_commodities layer in the TOC
3) Add a new node by clicking in the map and give it exactly the same node number as the terminal (it doesn’t matter if it is located in another position; it is only the node number that is important). The node number is specified by assigning it to the attribute “N”
4) Type in the TRANSF_TYPE value – for a terminal with transfer road to road, TRANSF_TYPE=1 (a list of the transfer types is located in the Data section window in Scenario Input\General tables\Transfer type of terminal)
5) For each commodity, disable (0) or enable (1) transfer at the terminal
6) If there is another transfer type (e.g., transfer road-train – for road mode, possible values for transfer type is 1 to 6) to edit, add the same node again in the same way as for the

previous transfer type, by setting the same node number and change all the other values for the specific case

Nodes layer:

1) In the “Layers” drop down menu, select the Nodes layer. On request, answer “Yes” to save the changes made
2) Tick and select the Nodes layer in the TOC
3) Add a new node with exactly the same node number as the terminal, in the same manner as in the Nodes_commodities layer
4) Define the following attributes:
   - If a zone has direct access to the terminal, ZONET=the number of zone. If no zone has direct access, define ZONET=0
   - DOMESTIC=1 if the terminal is Swedish, 0 otherwise
   - C_TECH_FAC and T_TECH_FAC=1
5) On the Editor toolbar, select Editor -> Stop Editing. Answer “Yes” to the question(s) whether to save the changes made

All the three node layers will now have the new terminal. Figure 46 below shows the Feature Explorer window for the three layers, displaying some of the attributes of the terminal.

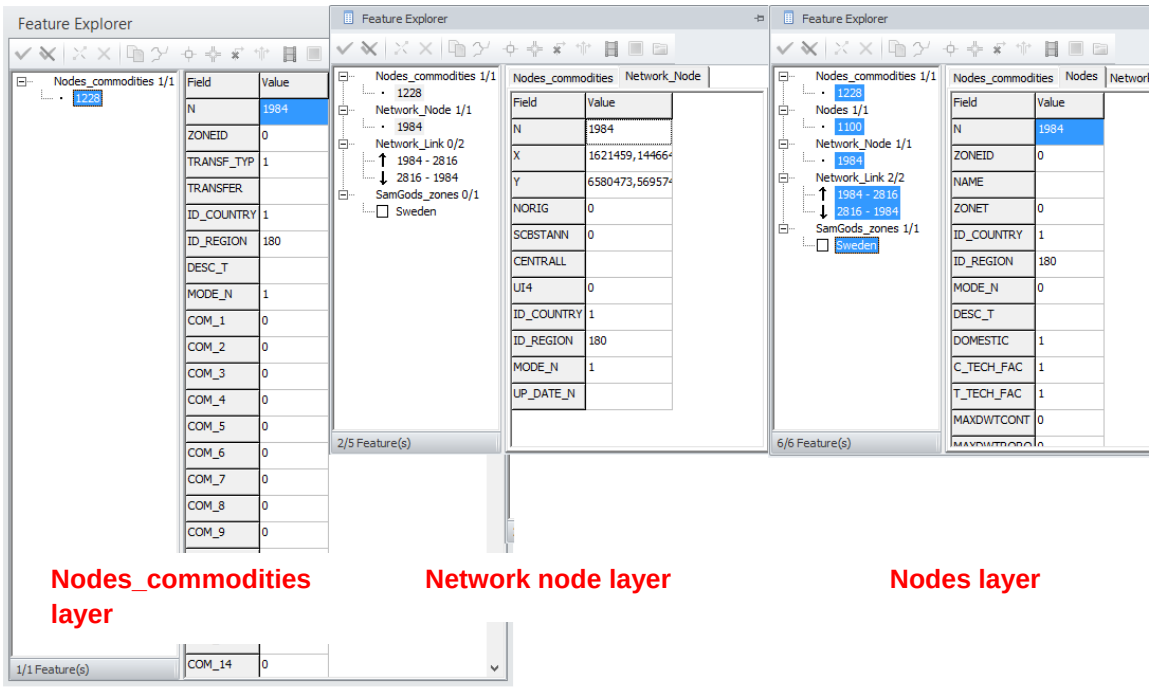


Figure 46 Feature Explorer windows for the Nodes_commodities layer, the Network_Node layer and the Nodes layer, all displaying the attributes of the new terminal.

Rail terminal

The required actions for adding a rail terminal are similar to the ones for a road terminal. Of course the attributes specific to the mode should be set for rail and railway vehicles instead of for road. The attributes that differ from the case with the road terminal are:

- MODE_N = 2
- Possible values for TRANSF_TYPE (please refer to the table Scenario Inputs\General tables\Transfer Type at terminals in the Data Section window)
- CATEGORY=211 for the rail link connection

The terminal must have a rail link to connect it to the rail network and a road link to connect it to the road network, see Figure 47 (if there is direct access from a zone to the terminal, the road connector is not mandatory). Please refer to the instructions for a new road terminal and for how to add a new railroad.

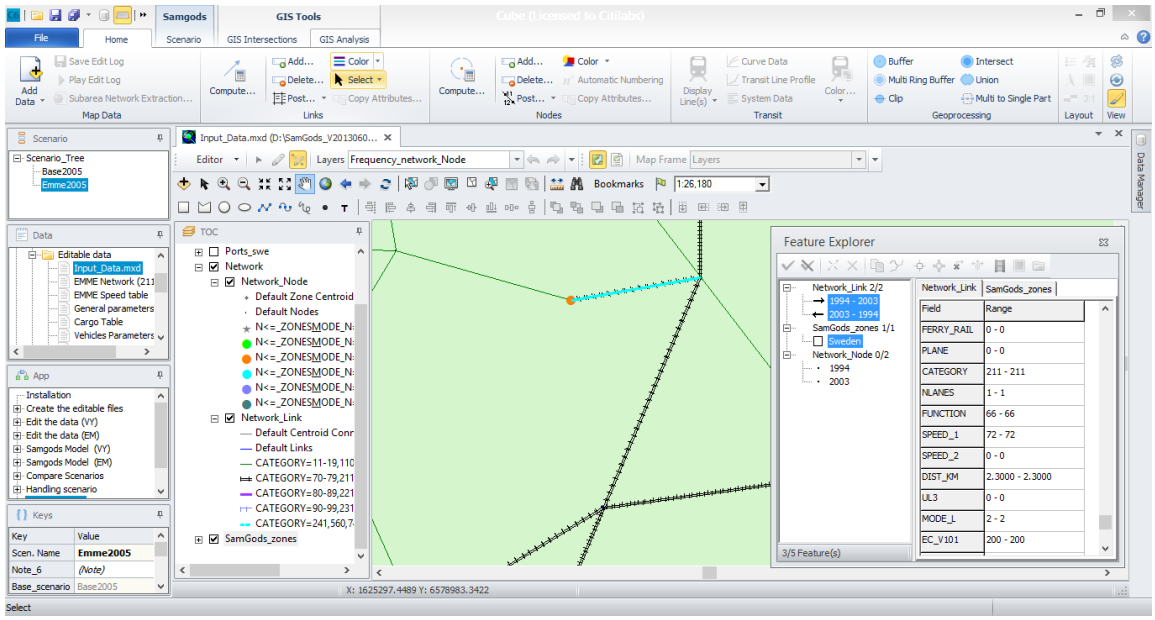


Figure 47 Nodes layer illustration for rail terminal, connected to the rail network by a rail link and to the road network by a road link.

Sea terminal

A new sea terminal is added in the same way as a rail terminal (except for the mode specific attributes), except that the Ports_swe layer also must be edited, by adding the new terminal to it in a similar way as in the Nodes_commodities layer. The attributes necessary to edit in the Ports_swe layer are:

- N = the same number as in the other three layers
- MODE_N = 3
- The pilot fees for each one of the vehicle types

Ferry terminal

A new ferry terminal is added in the same way as a rail terminal (except for the mode specific attributes).

Air terminal

A new air terminal is added in the same way as a rail terminal (except for the mode specific attributes).

5.7. Change speed on different links

1) Click “Edit” on the “ArcMap GIS Project File” catalog key using the *Edit the data* application, or open Scenario Inputs\Editable data\Input_Data.mxd from the Data section window for the specific scenario
2) Select the Network Link Layer in the TOC
3) Start an edit session (Editor -> Start editing)
4) Select the Network Link layer in the “Layers” drop down menu on the Editor toolbar
5) Make a selection (one or several links) and change the speed values in the Feature Explorer window based on the selection made. For each mode, the speed is managed in a different way, see below

5.7.1.1. Road Mode

1) Activate the filter for Road Mode (please refer to Section 0 for instructions)
2) If SPEED_1 and SPEED_2 for a link/links inside Sweden are equal to 0, the default values in the general tables will be applied. The default values for the base speed are in the delay tables in the Data Section window, Scenario Inputs\General tables\V101/V102 speed flow curves (V101 – applied to class 101, V102 – applied to classes 102-105)
3) The SPEED_1 field is defined as km per hour for vehicle class 101
4) SPEED_2 defines the speed for all other road vehicle classes (102-105)
5) Select a single link using the Select Features tool or select a group of links using Datasets -> Select by attributes… or Select by location… (see Section 0 for instructions). Edit the values directly in the Feature Explorer window or using Link -> Compute
6) When all edits have been made, , select Editor -> Stop Editing on the Editor toolbar
7) On the request “Do you want to save your edits?”, click “Yes”
8) Close the GIS window by clicking on the X icon at the top right corner, without saving the ArcGIS Map Document (*.mxd) (if any edits to the legends and/or the layout have been made, the map could be saved, otherwise this is not necessary)

5.7.1.2. Rail Mode

1) Activate the filter for Rail Mode (please refer to Section 0 for instructions)
2) Select a single link using the Select Features tool or select a group of links using Datasets -> Select by attributes… or Select by location… (see Section 0 for instructions). Edit the speed value in the SPEED_1 attribute (in km/h) directly in the Feature Explorer window or using Link -> Compute (the SPEED_2 attribute is only used for road mode and should be set to 0 for all other modes)
3) On the Editor toolbar, select Editor -> Stop Editing
4) On the request “Do you want to save your edits?”, click “Yes”
5) Close the GIS window by clicking on the X icon at the top right corner without saving the ArcGIS Map Document (*.mxd) (if any edits to the legends and/or the layout have been made, the map could be saved, otherwise this is not necessary)

5.7.1.3. Sea Mode – enclosed waterways (CATEGORY=80 in Sweden and 540 outside Sweden)

1) Activate the filter for Sea Mode (please refer to Section 0 for instructions)
2) Select a link or set of links with CATEGORY=80 or 540, using the Select Features tool or Datasets -> Select by attributes… or Select by location… (see Section 0 for instructions). Edit the speed value in the SPEED_1 attribute (in km/h) directly in the Feature Explorer window or using Link -> Compute (the SPEED_2 attribute is only used for road mode and should be set to 0 for all other modes)
3) For the other sea categories, the default values in the Vehicles Parameters table are applied (see the next section)
4) On the Editor toolbar, select Editor -> Stop Editing
5) On the request “Do you want to save your edits?”, click “Yes”
6) Close the GIS window by clicking on the X icon at the top right corner without saving the ArcGIS Map Document (*.mxd) (if any edits to the legends and/or the layout have been made, the map could be saved, otherwise this is not necessary)

5.7.1.4. Sea Mode – All the other categories

1) Open the Vehicles Parameters table by clicking “Edit…” for the “General parameters of Vehicle Classes [Table]” catalog key using the *Edit the data* application or open Scenario Inputs\Editable data\Vehicles Parameters from the Data Section window for the specific scenario
2) Edit the speed values in the SPEED attribute for the vehicle classes 301-317
3) Close the table by clicking on the X icon at the top right corner
4) On request, click “Yes” to save the edits

5.7.1.5. Ferry Mode

1) Activate the filter for Ferry Mode (please refer to Section 0 for instructions)
2) Select a single link using the Select Features tool or select a group of links using Datasets -> Select by attributes… or Select by location… (see Section 0 for instructions). Edit the speed value in the SPEED_1 attribute (in km/h) directly in the Feature Explorer window or using Link -> Compute (the SPEED_2 attribute is only used for road mode and should be set to 0 for all other modes)
3) On the Editor toolbar, select Editor -> Stop Editing
4) On the request “Do you want to save your edits?”, click “Yes”
5) Close the GIS window by clicking on the X icon at the top right corner without saving the ArcGIS Map Document (*.mxd) (if any edits to the legends and/or the layout have been made, the map could be saved, otherwise this is not necessary)

5.7.1.6. Air Mode

1) Activate the filter for Air Mode (please refer to Section 0 for instructions)
2) Select a single link using the Select Features tool or select a group of links using Datasets -> Select by attributes… or Select by location… (see Section 0 for instructions). Edit the speed value in the SPEED_1 attribute (in km/h) directly in the Feature Explorer window or using Link -> Compute (the SPEED_2 attribute is only used for road mode and should be set to 0 for all other modes)

3) On the Editor toolbar, select Editor -> Stop Editing
4) On the request “Do you want to save your edits?”, click “Yes”
5) Close the GIS window by clicking on the X icon without saving the ArcGIS Map Document (*.mxd) (if any edits to the legends and/or the layout have been made, the map could be saved, otherwise this is not necessary)

6. Log reports

In this chapter, log reports from running some of the applications are presented. The reports include messages that help the user to better analyze and understand the results.

6.1. Edit the data application

The *Edit the data* log report is created when the *Edit the data (VY)/(EM)* application is run. Possible messages inside the log report file Report_ED_{Scenario_shortname}.txt under the scenario specific folder, or accessible from the Data section window under Scenario outputs\Edit the data Report, are listed and explained in Table 32.

Number of message inside the log report	**Purpose**	**Example of messages**	**Message explanation**
#1	Inform whether the scenario is editable or not	Report #1 – the scenario is still editable.	The scenario is in editable mode.
		Report #1 – the scenario is locked.	Changed the scenario into read only mode. It is not possible to change it back from the interface.
#2	Verify the Port_swe table	Report #2: the terminal *N(6.0) TERMINAL N(6.0)* is not a sea terminal!! Please check the ”Ports Sweden” layer.	The terminal number that is not a port is printed out. In the Ports_swe table there should be only sea terminals. If the terminal is not a port, it will not be saved in the table.
#3	Information on the number of zones	Report #3: the number of zones is *MAX NETWORK(5.0)*	Maximum number of zones in the highway network
#3	Verify the coherence between network and nodes	Report #3: the number of zones is not the same in the network and the node table. In the network there are *MAX NETWORK(5.0)* and in the nodes table *MAX NODES(5.0)*. Please check the Scenario network.	In this step the application updates the variable ZONES_M inside the general tables and gives the report.
#4	Verify the coherence between tables	Report #4: Please add the node *ZONE(6.0)* to the node table.	The zone is in the network but not in the nodes table.
		Report #4: Please add the node *ZONE(6.0)* to the network.	The zone is in the nodes table but not in the network.
		Report #4: Please add the sea terminal	The sea terminal is in the Node_Terminals but not in the

		ZONE(6.0) to the network.	network.
		Report #4: Please add the commodity node *ZONE(6.0)* to the network.	The node is in the Nodes_commodities table but not in the network.
		Report #4: Please add the frequency node *ZONE(6.0)* to the network.	The node is in the Frequency_Data_Node table but not in the network.
		Report #4: Please add the frequency node *ZONE(6.0)* to the network.	The node is in the Frequency_Data_Link table but not in the network.
#5	Verify the numbering system	Report #5 – numbering system. Node / Code_error / Description	Header of the message
		N / 1 / Missed the mode! – must be correct!	Missed the mode for node N – must be correct in the node table
		N / 2 / Missed the ID COUNTRY or the ID REGION code – must be correct!	Missed the ID_COUNTRY or the ID_REGION code in the node table for node N
#6	View the errors during the creation of NORIG numbers for the zones	List of errors during the creation of SCBSTANN for the zones	Header of the message
		The node is without MODE_N. Please check the data.	The mode for the zone is missing
		The node has no values available. Please check the data.	There are no node numbers available for the zone
#7	View the errors during the creation of NORIG numbers for the nodes	List of errors during the creation of NORIG for the nodes	Header of the message
		No more node numbers are available. Please check the data	There are no node numbers available for the node

Table 32 Reports for *Edit the data* application

6.2. Samgods Model (VY/EM) application

The Existing Outputs log report is created when the *Samgods Model (VY)* application is run. The messages inside the log report file Report_SG_{Scenario_shortname}.txt under the scenario specific folder, or accessible from the Data Section window in Scenario outputs\Samgods Report\Existing Outputs, are listed and explained in Table 33.

Number of message inside the log report	**Purpose**	**Example of messages**	**Message explanation**
#1	Analyze inconsistencies between input data in different runs	The output *OUTPUT* for the commodity *ID_COM(2.0)* was created with a different Input data. Please check the scenario data. The previous run has *DATE_E* and the current run has *DATE_L*.	Warning that the input data has been modified between the last run and the current run.
	List of output files	The results have been made by Voyager. The output under *path* is available.	List of all available output files and their locations.

Table 33 Reports for the *Samgods Model (VY)* application.

6.3. Handling scenario application

The Report for the import phase is created when the Import function in the *Handling Scenario* application is run. The messages inside the log report file Report_HL_{Scenario_shortname}.txt under the scenario specific folder, or accessible from the Data Section window under Scenario Outputs\Import function Report\Report for the import phase, are listed in Table 34.

Possible messages	**Required actions**
All the catalog keys have the correct value. No actions are requested.	Nothing
List of catalog keys that have to be changed and how.	Change the listed catalogue keys for the imported scenario under “Scenario Parameters” in the *Handling Scenario* application and run the application again. Check the report again.

Table 34 Reports for the *Handling scenario* application.

7. Check-list when errors occur

- Do you have the required administrative rights to install and run the Samgods GUI?
- Is the python folder properly defined?
- Is the model user role correct? Model applier is typically used when running scenarios etc., while Model developer typically is used during installation and setting up the system.

- What is the ReturnCode no? ReturnCode 2 is a fatal error – view the error report.
- Is the name of the scenario correct? Geodatabase format does not allow:
    - Begin the name with numbers (i.e., 01_scenario is not allowed, but scenario_01 is OK)
    - Special characters (like space “ “ or -,+, etc.)
    - Too long names
    - Spaces, use underscore (“_”) instead.
- Some errors (regarding delimiter problems with “.” and “,”) could be solved by setting the National settings for the PC to British
- If the logistics module stops operating, the reason could be that the execution is split up on too many processors. RAM per processor should be at least 1.8 GB. The number of processors to use is set in the interface, via a catalog key in the *Samgods model* application, see Section 3.6 or 1.

8. References

1. de Jong, G., Baak, Method Report - Logistics Model in the Swedish National Freight Model System (Version 2.1), Deliberable 6B for Trafikverket, March 2014

2. de Bok, M., Baak, J., de Jong, G., Program documentation for the logistics model for Sweden, March 2014

3. Edwards, H**.**, Swedish Base Matrices Report. Estimates for 2004, estimation methodology, data, and procedures. March 2008

4. Vierth, I., Lord, N., McDaniel, J., Representation of the Swedish transport and logistics system (Logistics Model 2.00), VTI 2009

9. Appendices

9.1. Dimensions in the model

The following tables are copied from the program documentation (reference no.1 on previous page, Appendix A).

Table A-1: Overview of commodity types:

Nr	Commodity	Aggregate commodity	Average shipment size
1	Cereals	Dry bulk	41.0
2	Potatoes, other vegetables, fresh or frozen, fresh fruit	Dry bulk	3.8
3	Live animals	Dry bulk	3.8
4	Sugar beet	Dry bulk	0.3
5	Timber for paper industry (pulpwood)	Dry bulk	41.2
6	Wood roughly squared or sawn lengthwise, sliced or peeled	Dry bulk	9.2
7	Wood chips and wood waste	Dry bulk	122.8
8	Other wood or cork	Dry bulk	43.4
9	Textiles, textile articles and manmade fibres, other raw animal and vegetable materials	General cargo	0.2
10	Foodstuff and animal fodder	General cargo	1.8
11	Oil seeds and oleaginous fruits and fats	Liquid bulk	14.1
12	Solid mineral fuels	Liquid bulk	164.5
13	Crude petroleum	Liquid bulk	19 739.1
14	Petroleum products	Liquid bulk	103.1
15	Iron ore, iron and steel waste and blast-furnace dust	Dry bulk	4212.2
16	Non-ferrous ores and waste	Dry bulk	135.9
17	Metal products	General cargo	12.9
18	Cement, lime, manufactured building materials	Dry bulk	7.2
19	Earth, sand and gravel	Dry bulk	20.5
20	Other crude and manufactured minerals	Dry bulk	29.1
21	Natural and chemical fertilizers	Dry bulk	55.6
22	Coal chemicals	Liquid bulk	3.2
23	Chemicals other than coal chemicals and tar	Dry bulk	3.1
24	Paper pulp and waste paper	Dry bulk	173.9
25	Transport equipment, whether or not assembled, and parts thereof	General cargo	1.7
26	Manufactures of metal	General cargo	0.9
27	Glass, glassware, ceramic products	General cargo	1.1
28	Paper, paperboard; not manufactures	Dry bulk	23.3
29	Leather textile, clothing, other manufactured articles than paper, paperboard and manufactures thereof	General cargo	0.6
30	Mixed and part loads, miscellaneous articles	General cargo	No PWC flow for this commodity
31	Timber for sawmill	Dry bulk	40.9
32	Machinery, apparatus, engines, whether or not assembled, and parts thereof	General cargo	18.2
33	Paper, paperboard and manufactures thereof	General cargo	0.3

34	Wrapping material, used	Dry bulk	0.6
35	Air freight (2006 model)	General cargo	2.9

Table A-2: Overview of vehicle type numbers, and aggregate modes for container transport and non-container transport.

Aggregate mode		ModeNr	VhclNr	Vehicle type
Containers	Heavy lorry	A	104	Lorry HGV 25-40 ton
			105	Lorry HGV 25-60 ton
	Kombi train	D	201	Kombi train
	Feeder train	E	202	Feeder/shunt train
	Wagonload train	F	203	Wagon load train
	Direct Sea	J	301	Container vessel 5 300 dwt[1]
			302	Container vessel 16 000 dwt[1]
			303	Container vessel 27 200 dwt[1]
			304	Container vessel 100 000 dwt[1]
			305	Other vessel 1 000 dwt
			306	Other vessel 2 500 dwt
			307	Other vessel 3 500 dwt
			308	Other vessel 5 000 dwt
			309	Other vessel 10 000 dwt
			310	Other vessel 20 000 dwt
			311	Other vessel 40 000 dwt
			312	Other vessel 80 000 dwt
			313	Other vessel 100 000 dwt
			314	Other vessel 250 000 dwt
			315	Ro/ro vessel 3 600 dwt
			316	Ro/ro vessel 6 300 dwt
			317	Ro/ro vessel 10 000 dwt
	Feeder vessel	K	301	Container vessel 5 300 dwt
			315	Ro/ro vessel 3 600 dwt
			316	Ro/ro vessel 6 300 dwt
	Long-Haul vessel	L	303	Container vessel 27 200 dwt
			304	Container vessel 100 000 dwt
			317	Ro/ro vessel 10 000 dwt
Non-Containers	Light Lorry	B	101	Lorry light LGV, ≤ 3,5 ton
			102	Lorry medium 3,5-16 ton
			103	Lorry medium16-24 ton
	Heavy lorry	C / S[13]	104	Lorry HGV 25-40 ton
			105	Lorry HGV 25-60 ton

[13] Consolidated heavy lorry is coded as mode S in the chains file. Consolidation in heavy lorries is only available on an intermediate leg in a chain with at least three legs.

	Feeder train	G	202	Feeder/shunt train
	Wagonload train	H	203	Wagon load train
	System train	I	204	System train STAX 22,5
		T	205	System train STAX 25
		U	206	System train STAX 30
	Direct Sea	M	305	Other vessel 1 000 dwt
			306	Other vessel 2 500 dwt
			307	Other vessel 3 500 dwt
			308	Other vessel 5 000 dwt
			309	Other vessel 10 000 dwt
			310	Other vessel 20 000 dwt
			311	Other vessel 40 000 dwt
			312	Other vessel 80 000 dwt
			313	Other vessel 100 000 dwt
			314	Other vessel 250 000 dwt
			315	Ro/ro vessel 3 600 dwt
			316	Ro/ro vessel 6 300 dwt
			317	Ro/ro vessel 10 000 dwt
	Feeder vessel	N	315	Ro/ro vessel 3 600 dwt
			316	Ro/ro vessel 6 300 dwt
	Long-Haul vessel	O	317	Ro/ro vessel 10 000 dwt
	Road Ferry	P	318	Road ferry 2 500 dwt
			319	Road ferry 5 000 dwt
			320	Road ferry 7 500 dwt
	Rail Ferry	Q	321	Rail ferry 5 000 dwt
	Plane	R	401	Freight airplane

Table A-3: Transport chains used for Sweden

Number	Potential Chain	Explanation
1	A	Direct transport by heavy lorry, using containers (see Table 3)
2	ADA	Heavy lorry, Kombi train - heavy lorry, with containers
3	ADJA	Etc.
4	ADJDA	
5	ADKL	
6	AJ	
7	AJA	
8	AJDA	
9	AKL	
10	APA	
11	B	
12	BR	
13	BRB	
14	BS	
15	BSB	
16	C	
17	CGH	
18	CGHC	
19	CGHM	
20	CH	
21	CHG	
22	CHGC	
23	CM	
24	CMC	
25	CMI	
26	CMT	
27	CMU	
28	CPC	
29	CUM	
30	GH	
31	GHC	
32	GHG	
33	GHM	
34	GHMI	
35	GHMT	
36	GHMU	
37	GHQH	
38	HC	
39	HG	
40	HGC	
41	I	
42	IM	

Number	Potential Chain	Explanation
43	IMC	
44	IMHG	
45	J	
46	JA	
47	KL	
48	LK	
49	LKA	
50	LKDA	
51	M	
52	MC	
53	MHG	
54	MHGC	
55	MI	
56	MT	
57	MU	
58	RB	
59	SB	
60	T	
61	TM	
62	TMC	
63	TMGH	
64	U	
65	UM	
66	UMC	
67	UMGH	

9.2. Tests conducted – Emme vs. Voyager

PC performances:

- Software:
  - Operative system: Windows Server 2008 R2 Standard SP1 64 bit
- Hardware:
  - Processor: Intel® Xenon(R) E5530 CPU 2.40 GHz (2 processors)
  - RAM 18.00 GB

1) Full run of the *Samgods Model* application using both Voyager and EMME for the commodities (1-35) and 1 processor for the Logistic Module:

- Voyager: 11 hours and 22 minutes
- Emme: 12 hours and 3 minutes

2) LOS calculation

- Voyager: 20 minutes
- Emme: 24 minutes

3) Assignment

- Voyager: 8 minutes
- Emme: 38 minutes

9.3. Empty vehicles description

The computation of the empty vehicles matrices in the current version of the model is based on a non-linear, non-separable model. Therefore the output in terms of empty vehicle flows will depend on the set of commodities included in the logistics model simulations. The flows of empty vehicles will be correctly estimated only if the model is run for all commodities. To obtain between scenarios comparable results it is therefore recommended that the model is run for all commodities. There are two cases:

- EMPTY_OK: the catalogue key for selecting the commodity group is set to 0, which means that all commodities are selected for the logistics model simulation
- EMPTY_ERROR: all other cases, i.e. the model is run for one commodity or STAN group only. In this case the empty vehicle flows will be wrongly estimated

The program originally gives three kinds of output matrices: The number of empty vehicles, the total number of (loaded and empty) vehicles and the number of tonnes transported. In the EMPTY_ERROR case, the total number of vehicles will be incorrect as well. This issue is dealt with in two ways, presented below.

1: Compute the number of loaded vehicles.

Instead of producing the total number of vehicles (empty + loaded), the program now produces the number of loaded vehicles. This is done by default, by computing

the number of loaded vehicles = total number of vehicles – number of empty vehicles

in an intermediate step in Cube, after the logistics model. This operation will always give the correct result, since the estimated number of empty vehicles (with any errors) is subtracted from the total number of vehicles in all OD relations (containing the same errors). The output in the current version is thus made up by the three types of matrices:

- Number of loaded vehicles (always correct values)
- Number of empty vehicles (comparable and correct only in case EMPTY_OK)
- Tonnes (correct values)

Furthermore, the total number of vehicles will be computed (by adding the empty and loaded vehicles outputs) in the case EMPTY_OK. For the other case – EMPTY_ERROR – the total number of vehicles will be replaced by zeros in order to reduce the risk of using incorrect values. This gives the extra output

- Total number of vehicles (correct in case EMPTY_OK, set to zero otherwise)

The output in terms of total number of vehicles appears in some of the tables, but not in any of the networks. Generally, in the outputs, the number of vehicles always refers to the number of loaded vehicles, if nothing else is said.

2: Skip estimation of the empty vehicles

The user is given the option to not produce the empty vehicle matrices at all. The choice is made by setting the attribute

- EMPTY_V = 1 to produce empty vehicle matrices, or
- EMPTY_V = 0 to not produce empty vehicle matrices

The attribute is set for each vehicle class separately, in the table “Vehicle Parameters” (see Section 5.4). If EMPTY_V=0, the empty vehicle matrices will be filled with zeroes.

Summarizing all the possibilities, we have the following cases and the result in each case:

	EMPTY_V=0	EMPTY_V=1
EMPTY_OK	Empty vehicles = 0 Total vehicles = loaded vehicles	Empty vehicles ≠ 0 Total vehicles = empty + loaded
EMPTY_ERROR	Empty vehicles = 0 Total vehicles = 0	Empty vehicles ≠ 0 Total vehicles = 0

Table 35 All different cases for the empty and total vehicles calculation.

The empty vehicles calculation was designed for lorries, but is used for all vehicles as described above.

9.4. Frequency network

The frequency networks are saved and can be displayed as GIS maps in the Samgods model and could be edited as any other GIS layers, using the Compute function or the Feature Explorer window. However, editing these layers in the GIS window is rather difficult and slow. New terminals are given default frequencies, so that the user does not have to edit the frequency networks unless any specific frequencies should be changed. The reason for saving the frequency data as GIS layers instead of a matrix is that it saves hard disk space. The user just has to think of the node layer as the diagonal elements of the imagined frequency matrix (giving the frequencies within zones) and the link layer as the non-diagonal elements, giving the frequencies between zones. By default, the frequency network layers are initially filtered to show only the links and nodes connected to Stockholm.

9.5. Variable names and their meaning

Below, some of the variable names in different tables in the interface are listed and explained. Table 2 in Section 2.3 also gives information to help to understand the contents of the tables.

9.5.1.1. Variables in the output tables

In the output tables, different variable names appear. Below Table 37 is giving the variables, their meaning and in which data set (in the Data Section window) they appear. These data sets are found in Scenario Outputs\Samgods Report\Logistics Module\OD Covered and Scenario Outputs\Samgods Report\Reports.

Generally, the following abbreviations are used, separated by an underscore sign:

NV	Number of vehicles
KM	Kilometer
TON	Tonne
TKM	Tonne Kilometer
VKM	Vehicle Kilometer
DOM	Domestic
DTOT	Total domestic (domestic + domestic part of international)
INT	International
TOT	Total (in the sense total domestic + international)
L	Loaded (vehicle)
E	Empty (unloaded vehicle)
A	All (in the sense loaded + empty vehicles)

Table 36 Abbreviations used for variable names

Data set	Variable	Meaning
Output by vehicle class	NV_DTOT	Number of vehicles, total domestic
Output by vehicle class	NV_INT	Number of vehicles, international
Output by vehicle class	NV_TOT	Number of vehicles, total
Output by vehicle class, Output by chain	KM_DTOT	Number of kilometres, total domestic
Output by vehicle class, Output by chain	KM_INT	Number of kilometres, international
Output by vehicle class, Output by chain	KM_TOT	Number of kilometres, total
Output by vehicle class, Output by chain	TON_DTOT	Number of tonnes, total domestic
Output by vehicle class, Output by chain	TON_INT	Number of tonnes, international
Output by vehicle class, Output by chain	TON_TOT	Number of tonnes, total
Output by vehicle class, Output by chain	TKM_DTOT	Number of tonne kilometres, total domestic
Output by vehicle class, Output by chain	TKM_INT	Number of tonne kilometres, international
Output by vehicle class, Output by chain	TKM_TOT	Number of tonne kilometres, total
Output by vehicle class	ALF_DOM	Average loading factor, domestic
Output by vehicle class	ALF_INT	Average loading factor, international
Output by vehicle class	ALF_TOT	Average loading factor, total
Output by vehicle class	AVDIST_DOM	Average distance, domestic
Output by vehicle class	AVDIST_INT	Average distance, international
Output by vehicle class	AVDIST_TOT	Average distance, total
Output by chain	COST_DOM	Logistic cost, domestic
Output by chain	COST_DTOT	Logistic cost, total domestic
Output by chain	COST_INT	Logistic cost, international
Output by chain	COST_TOT	Logistic cost, total
Output by chain	AC_TKM_DOM	Average cost per tonne kilometre, domestic
Output by chain	AC_TKM_INT	Average cost per tonne kilometre, international
Output by chain	AC_TKM_TOT	Average cost per tonne kilometre, total
Report #1	NV_A_TOT	Number of vehicles, loaded + empty, total domestic + international

Data set	Variable	Meaning
Report #1	NV_A_DTOT	Number of vehicles, loaded + empty, total domestic
Report #1	VKM_A_TOT	Number of vehicle kilometres, loaded + empty, total domestic + international
Report #1	VKM_A_DTOT	Number of vehicle kilometres, loaded + empty, total domestic
Report #1	NV_L_TOT	Number of loaded vehicles, total domestic + international
Report #1	NV_E_TOT	Number of empty vehicles, domestic + international
Report #1	VKM_L_TOT	Number of loaded vehicle kilometres, domestic + international
Report #1	VKM_E_TOT	Number of unloaded vehicle kilometres, domestic + international
Report #1	NV_L_DTOT	Number of loaded vehicles, total domestic
Report #1	NV_E_DTOT	Number of empty vehicles, total domestic
Report #1	VKM_L_DTOT	Number of loaded vehicle kilometres, total domestic
Report #1	VKM_E_DTOT	Number of empty vehicle kilometres, total domestic
Report #4	TON_DTOT	Number of tonnes, total domestic
Report #4	TON_INT	Number of tonnes, international
Report #4	TON_TOT	Number of tonnes, dom. + int.
Report #4	TKM_DTOT	Number of tonne kilometres, total domestic
Report #4	TKM_INT	Number of tonne kilometres, international
Report #4	TKM_TOT	Number of tonne kilometres, totaldomestic + international
Report #9	VKM_L_ROAD	Number of loaded vehicle kilometres, road mode
Report #9	VKM_E_ROAD	Number of empty vehicle kilometres, road mode
Report #9	VKM_A_ROAD	Number of vehicle kilometres, empty + loaded vehicles on road
Report #9	TKM_ROAD	Number of tonne kilometres on road

Data set	Variable	Meaning
Report #9	VKM_L_RAIL	Number of loaded vehicle kilometres, rail mode
Report #9	VKM_E_RAIL	Number of empty vehicle kilometres, rail mode
Report #9	VKM_A_RAIL	Number of vehicle kilometres, empty + loaded vehicles on rail
Report #9	TKM_RAIL	Number of tonne kilometres on rail

Table 37 Variable names used in the output files in the folders Scenario Outputs\Samgods Report\Logistics Module\OD Covered and Scenario Outputs\Samgods Report\Reports in the Data Section window

9.5.1.2. Variables in the assigned networks

Below, some of the variables found in the attribute tables of the assigned networks are listed and explained. The outputs in terms of assigned networks are found in the folders Scenario Outputs\ Samgods Report\Assignment (assigned networks per mode), Scenario Outputs\Samgods Report\Reports (assigned network with all modes) and Scenario Outputs\Compare\Assignment (differences between the current scenario and the base scenario in loaded vehicle flows for all modes). In the assigned networks (except the compared vehicle flows, see below), the rule for the variable names is the following:

Each vehicle class has a label (the labels are found in the table Scenario Inputs\Editable data\Vehicles Parameters in the data Section window). For example, vehicle class 101 has the label LGV3. For each vehicle class there are three attributes in the network, which for the example for LGV3 are LGV3 (only the label), LGV3T (label + T) and LGV3E (label + E). LGV3 then gives the number of loaded LGV3 vehicles per year on the link, LGV3T gives the number of tonnes transported by LGV3 vehicles per year and LGV3E gives the number of empty (unloaded) LGV3 vehicles per year. There is one exception from this rule and that is the attribute FS_TRAIN, which cannot be found in the Vehicles Parameters table. FS_TRAIN is the sum of the attributes FEEDV and FEEDW which are two separated assignments for vehicle class 202 (Feeder/shunt train).

Except the attributes for each vehicle class, there are also aggregated numbers in the networks (for air mode there are no aggregated numbers, since there is only one vehicle class for air mode (label FLYG)):

Variable	Meaning
TOT_ROAD	Total number of loaded road vehicles
TOT_RAIL	Total number of loaded rail vehicles
TOT_SEA	Total number of loaded sea vehicles
TOT_ROAD_T	Total numbers of tonnes transported by road vehicles
TOT_RAIL_T	Total numbers of tonnes transported by trains
TOT_SEA_T	Total numbers of tonnes transported by sea vehicles
TOT_ROAD_E	Total number of empty road vehicles
TOT_RAIL_E	Total number of empty rail vehicles
TOT_SEA_E	Total number of empty sea vehicles
VOLTO	Total number of loaded vehicles

TONTO	Total number of tonnes transported
EMPTO	Total number of empty vehicles

Table 38 Variable names in the assigned networks and their meanings.

For the compared assigned network, only the loaded vehicle flows are included and they are represented by the vehicle class label, with the prefix DIF. For the example used above, the variable DIF_LGV3 gives the difference in number of loaded LGV3 vehicles, between the current scenario and the base scenario. Also there are differences in aggregated loaded vehicle flows, represented by e.g. DIF_ROAD and DIF_VOLTO (the latter gives the compared flows summed for all vehicle types).

9.6. Calibration in version 0.8

The capabilities introduced with the new logistic module (dated 20140317) were used to calibrate the model in terms of:

- Overall total domestic tonkm per mode
- Total tones on port areas
- Öresund bridge: number of vehicles for road mode and tones for rail mode

The calibration has involved changes on the following input parameters:

- CONSOL and CONSOL<mode>: lower and upper bound total and for main chain. CONSOL<mode> was introduced in the latest logistic module version
- TONNES=”DYNAMIC_AVE”: Typical shipment size will be different for different zones and calculated as the average mean of the PC matrix.
- Alpha and ProportionalOrderCosts: The annual demand dependent order costs are calculated as: OrderCosts = FixedOrderCosts + ProportionalOrderCosts x AnnualDemand^Alpha
- ALL_LORRY_TYPE_CONSOL, INDIVIDUAL_OD_LEG_OPTIMIZE and MINIMUM_ANNUAL_TONNE_DEMAND_4_FREQ_OPTIMIZE
- CostTechnoFac and TimeTechnoFac on ports

The calibration was carried out in the following manner:

- Sensitivity tests for each parameter that allows range of values. For instance for MINIMUM_ANNUAL_TONNE_DEMAND_4_FREQ_OPTIMIZE were tested 1, 10 and 100
- Switch on and off the parameters that call a function. For instance ALL_LORRY_TYPE_CONSOL=0 or ALL_LORRY_TYPE_CONSOL=1
- When identified the parameters that give higher elasticity in the results (mainly CONSOL<mode> and CostTechnoFac and TimeTechnoFac), they were combined all together

In the next paragraphs a brief explanation for each parameter and the final values specified in the calibrated scenario will be presented.

9.6.1. Parameters used for calibration

9.6.1.1. CONSOL and CONSOL<Mode>

CONSOL is the default consolidation range used when no mode specific range is specified. The lower and upper bound values are specified via catalog keys 17th and 18th:

- Lower bound for consolidation factor [Tonnes] (new) (applied to all commodities)
- Upper bound for consolidation factor [Tonnes] (new) (applied to all commodities)

described in tables 7 and 10.

CONSOL<Mode> is a developer table under Input_data.mdb and contains the lower and upper bound for consolidation factor by mode.

For an exhaustive description on how those parameters work in the logistic module see "de Jong, G., Baak, Method Report - Logistics Model in the Swedish National Freight Model System (Version 2.1), Deliberable 6B for Trafikverket, March 2014" pg. 32.
The combinations of possible legs pairs are ranked according to total potential and allocated values of load factor uniformly in a certain range between 0 and 1. The CONSOL<Mode> values will specified the allowed range for choice.

The values applied are:

ID	MODE_C	CONSOL_L	CONSOL_U
1	A	0.1	0.3
2	B	0.02	0.3
3	C	0.02	0.3
4	D	0.6	0.6
5	E	0.6	0.6
6	F	0.6	0.6
7	G	0.6	0.6
8	H	0.6	0.6
9	I	0.7	1
10	T	0.7	1
11	U	0.7	1
12	J	0.01	0.2
13	K	0.01	0.2
14	L	0.01	0.2
15	M	0.01	0.2
16	N	0.01	0.2
17	O	0.01	0.2
18	P	0.15	0.8
19	Q	0.15	0.8
20	R	0.15	0.7
21	S	0.1	0.25

Table 39 lower and upper bound for consolidation factors by mode.

9.6.1.2. TONNES

TONNES is the typical shipment size for commodity. This parameter is used to set the logistic cost parameter q and calculate the logistic costs for the chains. If this parameter is a number, then this number will be used as the typical shipment size for commodity.

If this the parameter is set to DYNAMIC_MAX, DYNAMIC_AVERAGE or DYNAMIC_GEOMEAN the typical shipment size will be different for different zones and calculated as the maximum, average or geometric mean of the PC matrix in the start shipmentsize values.

In the interface TONNES could be specified:

- In general terms, e.g. for all the commodities using the catalog key 19th described in Table 7 or 10
- Per each commodity under ”Commodity data [table]” in filed ”SHIP_SIZE”

The value applied in the current model is TONNES= DYNAMIC_AVERAGE[4].

9.6.1.3. Alpha and ProportionalOrderCosts

The order costs are not necessarily fixed over the entire range of annual demand for the f2f flow. The user can choose to make the order cost dependent on annual demand Q using variable order costs rate per unit of demand (ProportionalOrderCosts) and user-set coefficient Alpha.The equation will be:

OrderCosts = FixedOrderCosts + ProportionalOrderCosts x AnnualDemand^Alpha

In the interface those parameters are specified in ”Commodity data[table]” under fields PRORCOST and ALPHA.

The applied values are in the following table:

ID_COM	PRORCOST	ALPHA
1	2.19	0.5
2	6.5	0.5
3	15	0.5
4	0.62	0.5
5	0.5	0.5
6	11.3	0.5
7	0.84	0.5
8	0.69	0.5
9	320	0.5
10	34.9	0.5
11	4.13	0.5
12	1.2	0.5
13	4.31	0.5
14	5.71	0.5
15	0.71	0.5
16	12.8	0.5
17	18.2	0.5
18	3.84	0.5

[4] In Nationell Transportplan 2014-2025 the values used differ from what shown in this table. For those values refer to Appendix 9.7

ID_COM	PRORCOST	ALPHA
19	0.11	0.5
20	1.89	0.5
21	3.52	0.5
22	2501	0.5
23	30.5	0.5
24	3.62	0.5
25	136	0.5
26	39.1	0.5
27	29.2	0.5
28	8.13	0.5
29	48.5	0.5
30	36	0.5
31	0.54	0.5
32	92.9	0.5
33	30.6	0.5
34	3.95	0.5
35	1126	0.5

Table 40 Proportional order cost and alpha values applied by commodity.

9.6.1.4. ALL_LORRY_TYPE_CONSOL

The parameter determines whether or not all the lorry flows will be consolidated or not.

In the interface this parameter is specified using catalog key 14th under tables 7 and 10.

The value used in the current model is ALL_LORRY_TYPE_CONSOL=1.

Using ALL_LORRY_TYPE_CONSOL=0 will invoke the previous method present in Logistic Module V2.0., so the consolidation will be applied only for heavy lorries.

9.6.1.5. INDIVIDUAL_OD_LEG_OPTIMIZE

The OD leg optimization in previous logistic module was performed using:

$$\prod_{OD-legs} \text{(number of options per OD-Leg)}$$

In the new model there is the option to optimize the total logistic cost per OD-leg using:

$\sum_{OD-legs}$ (number of options per OD-Leg)

The parameter INDIVIDUAL_OD_LEG_OPTIMIZE will switch between old and new implementation (1= new implementation 0 = old implementation).

In the interface this parameter is specified using catalog key 15th under tables 7 and 10.

The value used in the current model is INDIVIDUAL_OD_LEG_OPTIMIZE =1.

9.6.1.6. MINIMUM_ANNUAL_TONNE_DEMAND_4_FREQ_OPTIMIZE

The user can choose to abandon the shipment size optimisation below a specific annual demand level, to prevent having too many very small flows specifying MINIMUM_ANNUAL_TONNE_DEMAND_4_FREQ_OPTIMIZE parameter.

In the interface this parameter is specified using catalog key 16th under tables 7 and 10.

The value used in the current model is MINIMUM_ANNUAL_TONNE_DEMAND_4_FREQ_OPTIMIZE =100.

9.6.1.7. CostTechnoFac and TimeTechnoFac

The two parameters control, in the logistic cost function, the perseption of time and monetary costs. A reduction of those factor will reduce the overall transport cost between terminals and conseguently a reduction of the overall logistic costs.

For an exaustive description of logistic cost function refer to pg. 3 and 4 of "de Jong, G., Baak, Method Report - Logistics Model in the Swedish National Freight Model System (Version 2.1), Deliberable 6B for Trafikverket, March 2014"

Them were used intensively in the calibration to shift tonnes from rail and road mode to sea mode. The high level of disaggregation (per terminal) has also allowed a fine calibration of tonnes trought each port area.

In the interface these parameters are specified in the input table “Zones and terminals attributes [geodata]” in fields C_TECH_FACT and T_TECH_FACT.

The applied values are in the below table[5]:

ZONEID	NAME	C_TECH_FAC	T_TECH_FAC
718021	Sea:_Stockholm	0.3	0.3
718121	Sea:_Södertälje	0.4	0.4
718221	Sea:_Nacka	0.3	0.3
718821	Sea:_Hallstavik	0.3	0.3
719221	Sea:_Nynäshamn	0.3	0.3
748121	Sea:_Oxelösund	0.4	0.4
758121	Sea:_Norrköping	0.4	0.4
786121	Sea:_Mönsterås	0.01	0.01
788021	Sea:_Kalmar	0.01	0.01

[5] In Nationell Transportplan 2014-2025 the values used differ from what shown in this table. For those values refer to Appendix 9.7

ZONEID	NAME	C_TECH_FAC	T_TECH_FAC
788221	Sea:_Oskarshamn	0.01	0.01
798021	Sea:_Visby	0.01	0.01
798022	Sea:_Slite	0.01	0.01
808221	Sea:_Karlshamn	0.01	0.01
808321	Sea:_Sölvesborg	0.01	0.01
828021	Sea:_Malmö	0.3	0.3
828221	Sea:_Landskrona	0.3	0.3
828321	Sea:_Helsingborg	0.3	0.3
828421	Sea:_Höganäs	0.3	0.3
828621	Sea:_Ystad	0.01	0.01
828721	Sea:_Trelleborg	0.01	0.01
829021	Sea:_Åhus	0.01	0.01
838021	Sea:_Halmstad	0.8	0.8
838221	Sea:_Falkenberg	0.8	0.8
838321	Sea:_Varberg	0.8	0.8
841521	Sea:_Stenungsund	0.05	0.05
841921	Sea:_Wallhamn	0.05	0.05
844721	Sea:_Otterbäcken	0.5	0.5
848021	Sea:_Göteborg	0.8	0.8
848421	Sea:_Brofjorden	0.05	0.05
848422	Sea:_Lysekil	0.05	0.05
848521	Sea:_Uddevalla	0.05	0.05
848621	Sea:_Strömstad	0.05	0.05
848721	Sea:_Vänersborg	0.5	0.5
848821	Sea:_Trollhättan	0.5	0.5
849421	Sea:_Lidköping	0.5	0.5
876121	Sea:_Karlstad	0.5	0.5
878121	Sea:_Kristinehamn	0.5	0.5
928021	Sea:_Härnösand	0.1	0.1
928121	Sea:_Sundsvall	0.1	0.1
928221	Sea:_Utansjö	0.1	0.1
928421	Sea:_Örnsköldsvik	0.1	0.1
928422	Sea:_Husum	0.1	0.1
940121	Sea:_Rundvik	0.1	0.1
948021	Sea:_Umeå	0.1	0.1
963921	Sea:_Köpenhamn	0.2	0.2
964421	Sea:_Rönne	0.2	0.2
964821	Sea:_Kolding	0.2	0.2
965021	Sea:_Århus	0.2	0.2
965221	Sea:_Frederikshavn	0.2	0.2
968221	Sea:_Ventspils	0.2	0.2
968222	Sea:_Liepaja	0.2	0.2
968521	Sea:_Klaipeda	0.2	0.2
969221	Sea:_Szczecin	0.2	0.2

ZONEID	NAME	C_TECH_FAC	T_TECH_FAC
969231	Sea_Ferry:_Swinouscie	0.2	0.2
969621	Sea:_Gdansk	0.2	0.2
972921	Sea:_Lubeck	0.2	0.2
972931	Sea_Ferry:_Travemunde	0.2	0.2
974021	Sea:_Rostock	0.2	0.2
974031	Sea_Ferry:_Rostock	0.2	0.2

Table 41 CostTechnoFac and TimeTechnoFac values applied to ports.

9.6.1.8. Comparisons

The comparison of overall total domestic tonkm per mode is:

	Tonkm*10^6			Diff abs			
Model	**ROAD**	**RAIL**	**SEA**	**ROAD**	**RAIL**	**SEA**	RMSE
Statistics	***39.90***	***22.30***	***36.90***	***-***	***-***	***-***	-
Samgods_V0.8	***46.12***	***22.03***	***50.49***	***6.02***	***-0.63***	***14.06***	***10.86***

The comparison of Total tones on port areas:

PortArea	Hamnområde namn	Statistics	Samgods V0.8
1	Haparanda-Skellefteå	11993	15449
2	Umeå-Sundsvall	8829	9011
3	Hudiksvall-Gävle	8365	7285
4	Norrtälje-Nynäshamn	13651	16724
5	Uppsala-Eskilstuna (Mälaren)	3368	6111
6	Södertälje-Norrköping	11630	16147
7	Västervik-Kalmar	4526	4071
8	Visby (Gotland)	5916	3382
9	Karlskrona-Trelleborg	22558	10940
10	Malmö-Helsingborg	16052	15351
11	Halmstad-Varberg	6182	6867
12	Göteborg(nedanför Trollhätte kanal)	36479	37007
13	Stenungsund-Strömstad	25483	24062
14	Trollhättan-Kristinehamn (Vänern)	2578	2086
Total		177610	174493
RMSE			3879
Diff Per			-2%

The comparison on Öresund bridge: number of vehicles for road mode and tones for rail mode:

	Type	Statistics	Samgods_V0.8
Road	# of Vehicles	251,589	295,856
Rail	Tonnes	3,692,598	6,386,541

The calibration process could be not considered conclusive since the results are not yet very close to statistics.

The main points that should be address in further calibration are:

- Tonkm are quite high in all the modes, this is an indicator that longer routes are chosen compared to reality. Further calibration on lower and upper bound values per mode, vehicle frequency and especially positional costs should be carried out
- The level of tons on ports is quite satisfactory. Further analysis for a better distribution should be focused on port areas 4, 5 and 6 (where the volumes are too high) and port areas 7, 8 and 9 (where there is the opposite situation)
- The Oresund bridge has too high rail tonnes. A different distribution about volumes on ports and a revision of the Vot and Cost per rail vehicles will reduce or eliminate this problem

9.7. Input data used in Nationell Transportplan 2014-2025

In this section are presented the main differences in terms of input definition between Samgods 0.8 and Samgods model used in Nationell Transportplan 2014-2025.

9.7.1.1. TONNES

Commodity group	Description	Tonnes
1	Cereals	41
2	Potatoes, other vegetables, fresh or frozen, fresh fruit	3.8
3	Live animals	3.8
4	Sugar beet	0.3
5	Timber for paper industry (pulpwood)	41.2
6	Wood roughly squared or sawn lengthwise, sliced or peeled	9.2
7	Wood chips and wood waste	122.8
8	Other wood or cork	43.4
9	Textiles, textile articles and manmade fibres, other raw animal and vegetable materials	0.2
10	Foodstuff and animal fodder	1.8
11	Oil seeds and oleaginous fruits and fats	14.1
12	Solid mineral fuels	164.5
13	Crude petroleum	19739.1
14	Petroleum products	103.1
15	Iron ore, iron and steel waste and blast-furnace dust	4212.2
16	Non-ferrous ores and waste	139.5
17	Metal products	12.9
18	Cement, lime, manufactured building materials	7.2
19	Earth, sand and gravel	20.5
20	Other crude and manufactured minerals	29.1
21	Natural and chemical fertilizers	56.6
22	Coal chemicals	3.2
23	Chemicals other than coal chemicals and tar	3.1
24	Paper pulp and waste paper	173.9
25	Transport equipment, whether or not assembled, and parts thereof	1.7
26	Manufactures of metal	0.9
27	Glass, glassware, ceramic products	1.1
28	Paper, paperboard not manufactures	23.3
29	Leather textile, clothing, other manufactured articles than paper, paperboard and manufactures there	0.6
30	Mixed and part loads, miscellaneous articles	0
31	Timber for sawmill	40.9
32	Machinery, apparatus, engines, whether or not assembled, and parts thereof	18.2
33	Paper, paperboard and manufactures thereof	0.3
34	Wrapping material, used	0.6
35	Air freight (2006 model)	2.9

9.7.1.2. CostTechnoFac and TimeTechnoFac

ZONEID	NAME	C_TECH_FAC	T_TECH_FAC
718021	Sea:_Stockholm	1	1
718121	Sea:_Södertälje	1	1
718221	Sea:_Nacka	1	1
718821	Sea:_Hallstavik	1	1
719221	Sea:_Nynäshamn	1	1
748121	Sea:_Oxelösund	1	1
758121	Sea:_Norrköping	1	1
786121	Sea:_Mönsterås	1	1
788021	Sea:_Kalmar	1	1
788221	Sea:_Oskarshamn	1	1
798021	Sea:_Visby	1	1
798022	Sea:_Slite	1	1
808221	Sea:_Karlshamn	1	1
808321	Sea:_Sölvesborg	1	1
828021	Sea:_Malmö	1	1
828221	Sea:_Landskrona	1	1
828321	Sea:_Helsingborg	1	1
828421	Sea:_Höganäs	1	1
828621	Sea:_Ystad	1	1
828721	Sea:_Trelleborg	1	1
829021	Sea:_Åhus	1	1
838021	Sea:_Halmstad	1	1
838221	Sea:_Falkenberg	1	1
838321	Sea:_Varberg	1	1
841521	Sea:_Stenungsund	1	1
841921	Sea:_Wallhamn	1	1
844721	Sea:_Otterbäcken	1	1
848021	Sea:_Göteborg	1	1
848421	Sea:_Brofjorden	1	1
848422	Sea:_Lysekil	1	1
848521	Sea:_Uddevalla	1	1
848621	Sea:_Strömstad	1	1
848721	Sea:_Vänersborg	1	1
848821	Sea:_Trollhättan	1	1
849421	Sea:_Lidköping	1	1
876121	Sea:_Karlstad	1	1
878121	Sea:_Kristinehamn	1	1
928021	Sea:_Härnösand	1	1
928121	Sea:_Sundsvall	1	1
928221	Sea:_Utansjö	1	1
928421	Sea:_Örnsköldsvik	1	1
928422	Sea:_Husum	1	1

ZONEID	NAME	C_TECH_FAC	T_TECH_FAC
940121	Sea:_Rundvik	1	1
948021	Sea:_Umeå	1	1
963921	Sea:_Köpenhamn	1	1
964421	Sea:_Rönne	1	1
964821	Sea:_Kolding	1	1
965021	Sea:_Århus	1	1
965221	Sea:_Frederikshavn	1	1
968221	Sea:_Ventspils	1	1
968222	Sea:_Liepaja	1	1
968521	Sea:_Klaipeda	1	1
969221	Sea:_Szczecin	1	1
969231	Sea_Ferry:_Swinouscie	1	1
969621	Sea:_Gdansk	1	1
972921	Sea:_Lubeck	1	1
972931	Sea_Ferry:_Travemunde	1	1
974021	Sea:_Rostock	1	1
974031	Sea_Ferry:_Rostock	1	1

9.7.1.3. Toll fees (SEK) and km-taxes values (SEK/km)

Vehicle Class	Austria	Germany	Sweden	Switzerland	Toll Oresund	Toll Stora Belt	Toll Svinesund
101	1.395			3.692	650	620	20
102	1.953	1.08		3.692	960	985	100
103	2.9295	1.17		3.692	960	985	100
104	2.9295	1.17		6.039	960	985	100
105	2.9295	1.17		6.039	960	985	100
201			4.47		5388	6584	
202			2.68		5388	6584	
204			4.47		5388	6584	
205			5.2		5388	6584	
206			24.39		5388	6584	
207			3.26		5388	6584	
208			4.47		5388	6584	
209			5.63		5388	6584	